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Clean CAM Technology –86 Demonstration Scientific and Technical Emission Summary Test Report Addendum
AGE Bio Diesel Emission Evaluation

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13. ABSTRACT *(Maximum 200 words)*
This report serves as the findings of a field study on an engine modification developed by Clean Cam Technology (CCT) that promises to reduce Nitrogen Oxide (NOx) emissions from various engines manufactured by Detroit Diesel. The Air Force hired Environmental Quality Management Inc. to modify four AM32A-86D generators that are equipped with Detroit Diesel 4L-71N engines, conduct emission tests on the four operating units every six months and record operational data on how well the four units operated during the one year field trial. This report provides emissions factors four the modified units and operational issues encountered during the field trials.

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ACRONYMS

AFB	Air Force Base
AFIERA	Air Force Institute for Environment, Safety, and Occupational Health Risk Analysis
AGE	Aerospace Ground Equipment
CCT	Clean Cam Technologies
CDRL	Contract Data Requirements List
CEM	continuous emissions monitoring
CFM	cubic feet per minute
CO	Carbon Monoxide
CO_2	Carbon Dioxide
DOT	Department of Transportation
DSCFM	dry standard cubic feet per minute
EQ	Environmental Quality Management, Inc.
FID	flame ionization detector
HAP	Hazardous Air Pollutant
IATA	International Aviation Transportation Association
ICAO	International Civil Aviation Organization
IXRF	Iridium X-ray Fluorescence
MCE	carbon mass rate – exhaust
MCF	carbon mass rate – fuel
MCI	carbon mass rate – inlet air
NIOSH	National Institute of Occupational Safety and Health
NO_X	Nitrogen Oxides
NMHC	Non Methane Hydrocarbons
PAH	Polynuclear Aromatic Hydrocarbons
PIC	product of incomplete combustion
PM	Particulate Matter
PPM	part per million
PPMVD	part per million by volume dry
RSEQ	Risk Analysis Environmental Quality
SAP	Sampling and Analysis Plan
SEM	scanning electron microscopy
SPO	System Program Office
TPM	Technical Program Manager
THC	total hydrocarbon
VOC	volatile organic compound

TEST METHOD REFERENCES

- Air Force Institute for Environment, Safety and Occupational Risk Analysis (AFIERA), *Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations*, January 2002.

- American Society of Testing Materials (ASTM), http://www.astm.org/cgi-bin/SoftCart.exe/STORE/standardsearch.shtml?E+mystore

- NIOSH Manual of Analytical Methods (NMAM), http://www.cdc.gov/niosh/nmam/nmammenu.html

- United States Environmental Protection Agency (USEPA), Title 40, Code of Federal Regulations, Part 60, Appendix A http://www.epa.gov/ttn/emc/tmethods.html

- USEPA SW846 http://www.epa.gov/epaoswer/hazwaste/test/methdev.htm

EXECUTIVE SUMMARY

The A/M32A–86D (–86) generator is one of the most widely used pieces of aerospace ground equipment (AGE) in the U.S. Air Force (AF). In June 1998, one –86 generator was retrofitted with the Clean Cam Technology (CCT) and tested at Southwest Research Institute in San Antonio, Texas. Emission test results showed that the CCT Retrofit reduced nitrogen oxide (NO_x) emissions by 76%, carbon monoxide (CO) and total hydrocarbon (THC) emissions each by 43%, and particulate matter (PM) emissions by 32% compared to non-retrofitted –86 generators. The emissions from the CCT unit met the Environmental Protection Agency (EPA) Non-Road Engine Emission Standards.

The purpose of this effort was to determine the long-term performance of the CCT retrofitted –86 generator. Prior to approving the CCT modification for general AF use, the AF needed to demonstrate that retrofitting did not negatively affect the operational performance of the unit, and that the CCT Retrofit reduced emissions to an acceptable level.

Program Objectives

In order to complete the objective of evaluating long-term AGE performance, four –86 generator engines (Detroit Diesel 4L-71N) were obtained through Warner Robins AFB in Georgia and retrofitted at the Clean Cam Technology Systems facility in Bakersfield, CA. Two of the retrofitted engines were then installed in two –86 generators (Units MG13 and MG18) at Elmendorf AFB (Engine Serial Numbers 4A268635 and 4A269999), and two of the retrofitted engines were installed in two –86 generators (Units DG87 and DG76) at Travis AFB (Engine Serial Numbers 4A268288 and 4A231886). Emissions were measured during a visit to each facility during the summer months of CY 2002. The operational performance of the retrofitted units was evaluated by AGE personnel at each base. The program simulated long-term CCT use, the impact of the CCT on emissions generated, and the effect of various ambient conditions on emissions and operational performance of the retrofitted units.

AGE Description

The –86 generator, rated at 148 brake horsepower (at 2000 rpm), is powered by the 4L-71N internal-combustion engine manufactured by Detroit Diesel Corporation. The Model A/M32A–86 is a naturally aspirated, two-stroke cycle, four-cylinder engine that utilizes a muffler and a 2-inch by 3-inch oval exhaust pipe exiting the bottom of the unit in a horizontal direction (Figure 2-1). The stock diesel motor was removed and replaced by a CCT retrofitted motor. The retrofit included a modified cam shaft, fuel injector, turbo charger exhaust, and other proprietary modifications. The generator can be fueled on either diesel or JP-8 fuel. Diesel and JP-8 fuel were used during the emission measurement program at Travis AFB. One generator was operated on diesel fuel at Travis AFB because diesel is the primary fuel type for ground support equipment at the base. Only JP-8 fuel was used at Elmendorf AFB.

Sampling Scenario

Specifically, the testing program assessed emissions of PM, including particle size, NO_x, CO, total non-methane hydrocarbons (TNMHC), and hazardous air pollutants (HAPs) through volatile organic compound (VOC), Polynuclear Aromoatic Hydrocarbon (PAH), and Aldehyde/Ketone sampling. In conjunction with these tests, engine exhaust gas flow rate, temperature, composition [carbon dioxide (CO_2) and oxygen (O_2)], and moisture were measured.

These parameters were measured at five specified loads: 10%, 25%, 50%, 75%, and 100% power. A load bank (an artificial load comprised of heating coils) provided the resistance necessary for AGE operation at the specified loads.

The JP-8 and diesel fuel (Travis AFB Unit DG87) used during the testing were sampled and analyzed for: percent sulfur, carbon, nitrogen, hydrogen, ash, aromatics, paraffins, olefins, naphthenes, and Btu per pound.

Emission Results

A summary of the criteria pollutant weighted emissions are provided in Table ES-1. The retrofitted units met the EPA Tier 2 standard for CO and the EPA Tier 1 standard for NO_x. The emissions were comparable for each test unit.

TABLE ES-1. A/M32-86 EMISSION SUMMARY

WEIGHTED RESULTS – BASED ON CCT PROVIDED HORSPEPOWER TRAVIS AFB

Unit No.	NO_X		CO		NMHC		PM		NO_X + NMHC
	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	g/hp-hr (a)
DG87	0.13	4.67	0.03	1.20	0.01	0.34	0.01	0.44	5.01
DG76	0.14	5.12	0.05	1.83	0.01	0.57	NA	NA	5.69
EPA Tier 1		6.9							
EPA Tier 2				3.7				0.22	4.9

(a) EPA will use an NMHC +NOx standard of 4.9 g/hp-hr for Tier 2 nonroad diesel engines

WEIGHTED RESULTS -ELMENDORF AFB

Unit No.	NO_X		CO		NMHC		PM		NO_X + NMHC
	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	g/hp-hr (a)
Mg13	0.13	4.72	0.04	1.45	0.01	0.56	0.01	0.47	5.28
EPA Tier 1		6.9							
EPA Tier 2				3.7				0.22	4.9

(a) EPA will use an NMHC +NOx standard of 4.9 g/hp-hr for Tier 2 nonroad diesel engines

WEIGHTING CRITERIA

Percent Load	Weighting Factor
100	0.05
75	0.25
50	0.30
25	0.30
10	0.10

Note: Weighting criteria specified in ISO 8178-4 "D2".

The weighted hazardous air pollutant emission indexes are summarized in Table ES-2. The total HAPs from unit MG13 were approximately three times higher than the DG87 unit. The MG13 unit was smoking during testing, indicating incomplete combustion, which contributes to higher HAP emissions.

TABLE ES-2. A/M32-86 GENERATOR TESTING HAZARDOUS AIR POLLUTANTS (HAPs) EMISSION FACTOR SUMMARY lbs/1000 lbs fuel

	Unit DG87 (Travis AFB)	Unit MG13 (Elmendorf AFB)
Exhaust Flow, dscfm	342	353
Average Fuel Flow, lbs/hr	4.41	4.90
Pollutant		
Formaldehyde	8.01E-03	3.16E-02
Acetaldehyde	5.67E-03	1.12E-02
Acrolein	1.11E-02	2.45E-02
2-Butanone (MEK)	5.96E-03	2.30E-02
Benzene	9.70E-02	1.22E-01
Bromomethane	1.11E-03	2.48E-02
Chloromethane	1.64E-03	4.25E-02
Toluene	5.96E-02	1.13E-01
Ethylbenzene	1.21E-02	5.31E-02
Methylene chloride	3.70E-03	9.20E-02
m,p-Xylene	4.04E-02	1.11E-01
Naphthalene	**ND**	6.10E-02
o-Xylene	1.62E-02	7.25E-02
Styrene	7.87E-04	**ND**
Total HAPs	**0.27**	**0.79**

ND = Non-Detect

Conclusions

The retrofitted units did not meet the EPA Tier 1 requirement for NO_x emissions, 6.9g/hp-hr. The emissions from the retrofitted units did not meet the EPA Tier 2 requirement for particulate matter, 0.22g/hp-hr; or NO_x and NMHC, 4.9g/hp-hr. All retrofitted units were below the EPA Tier 2 CO standard of 3.7g/hp-hr.

It was difficult for CCT to simulate the performance problems because no JP-8 fuel was available at the rebuild facility. Future efforts should consider a supply of military-specified JP-8 during the engine retrofit to note engine abnormalities during the shake-down and dynamometer test periods.

A description of the engine performance difficulties is provided in Appendix E. Difficulties were encountered primarily when generators were operated on JP-8 fuel. The retrofitted units at Travis AFB operated well while burning diesel fuel during the target period. The units did not smoke at start-up or during operation while burning diesel fuel. The retrofitted units were also able to hold operational load and maintain proper operating temperature.

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SECTION 1

INTRODUCTION

This Emission Summary Scientific and Technical Report has been prepared by Environmental Quality Management, Inc. (EQ) under Delivery Order Number T0702BG0204 of the General Services Administration (GSA) Federal Technology Service, IT Solutions, Greater Southeast Region (Contract Number GS-10F-0293K), Task FA5710043T6.

The project requirements are described in the contract and its attached Statement of Work.

The project includes preparation of the following:

- Sampling and Analysis Plan (SAP) (Data Item 2.5 submitted February 26, 2002)
- Monthly progress, status, and management reports (Data Item 2.2)
- Conference agenda and minutes (Data Item 2.4 , Submitted)
- A summary Scientific and Technical Report (Data Item 2.6, this document).

A description of the project background and objectives is provided in this section.

1.1 Background

The A/M32A–86D (–86) generator is one of the most widely used pieces of aerospace ground equipment (AGE) in the U.S. Air Force (AF). In June 1998, one –86 generator was retrofitted with the Clean Cam Technology (CCT) and tested at Southwest Research Institute in San Antonio, Texas. Emission test results showed that the CCT Retrofit reduced nitrogen oxide (NO_x) emissions by 76%, carbon monoxide (CO) and total hydrocarbon (THC) emissions each by 43%, and particulate matter (PM) emissions by 32% compared to non-retrofitted –86 generators. The emissions from the CCT unit met the Environmental Protection Agency (EPA) Non-Road Engine Emission Standards.

1.2 Objective

The purpose of this effort was to determine the long-term performance of the CCT retrofitted –86 generator. Prior to approving the CCT modification for general AF use, the AF needed to demonstrate that retrofitting did not negatively affect the operational performance of the unit, and that the CCT reduced emissions to an acceptable level.

In order to complete these objectives, four –86 generator engines (Detroit Diesel 4L-71N) were obtained through Warner Robins AFB in Georgia and retrofitted with the CCT at the Clean Cam Technology Systems facility in Bakersfield, CA. Two of the retrofitted engines were then installed in two –86 generators (Units MG13 and MG18) at Elmendorf AFB (Engine Serial Numbers 4A268635 and 4A269999), and two of the retrofitted engines were installed in two –86 generators (Units DG87 and DG76) at Travis AFB (Engine Serial Numbers 4A268288 and 4A231886) (see Figure 1-1). Emissions were measured during a visit to each facility during the summer months of CY 2002. The operational performance of the retrofitted units was evaluated by AGE personnel at each base. The program simulated long-term CCT use, the impact of the CCT on emissions generated, and the effect of various ambient conditions on emissions and operational performance of the retrofitted units.

Specifically, the testing program assessed emissions of PM, including particulate sizing, NO_x, CO, total non-methane hydrocarbons (TNMHC), and hazardous air pollutants (HAPs) through volatile organic compound (VOC), Polynuclear Aromoatic Hydrocarbon (PAH), and Aldehyde/Ketone sampling. In conjunction with these tests, engine exhaust gas flow rate, temperature, composition [carbon dioxide (CO_2) and oxygen (O_2)], and moisture were measured.

These parameters were measured at five specified loads: 10%, 25%, 50%, 75%, and 100% power. A load bank (an artificial load comprised of heating coils) provided the resistance necessary for AGE operation at the specified loads.

The JP-8 and diesel fuel (Travis AFB Unit DG87) used during the testing were sampled and analyzed for: percent sulfur, carbon, nitrogen, hydrogen, ash, aromatics, paraffins, olefins, naphthenes, and Btu per pound.

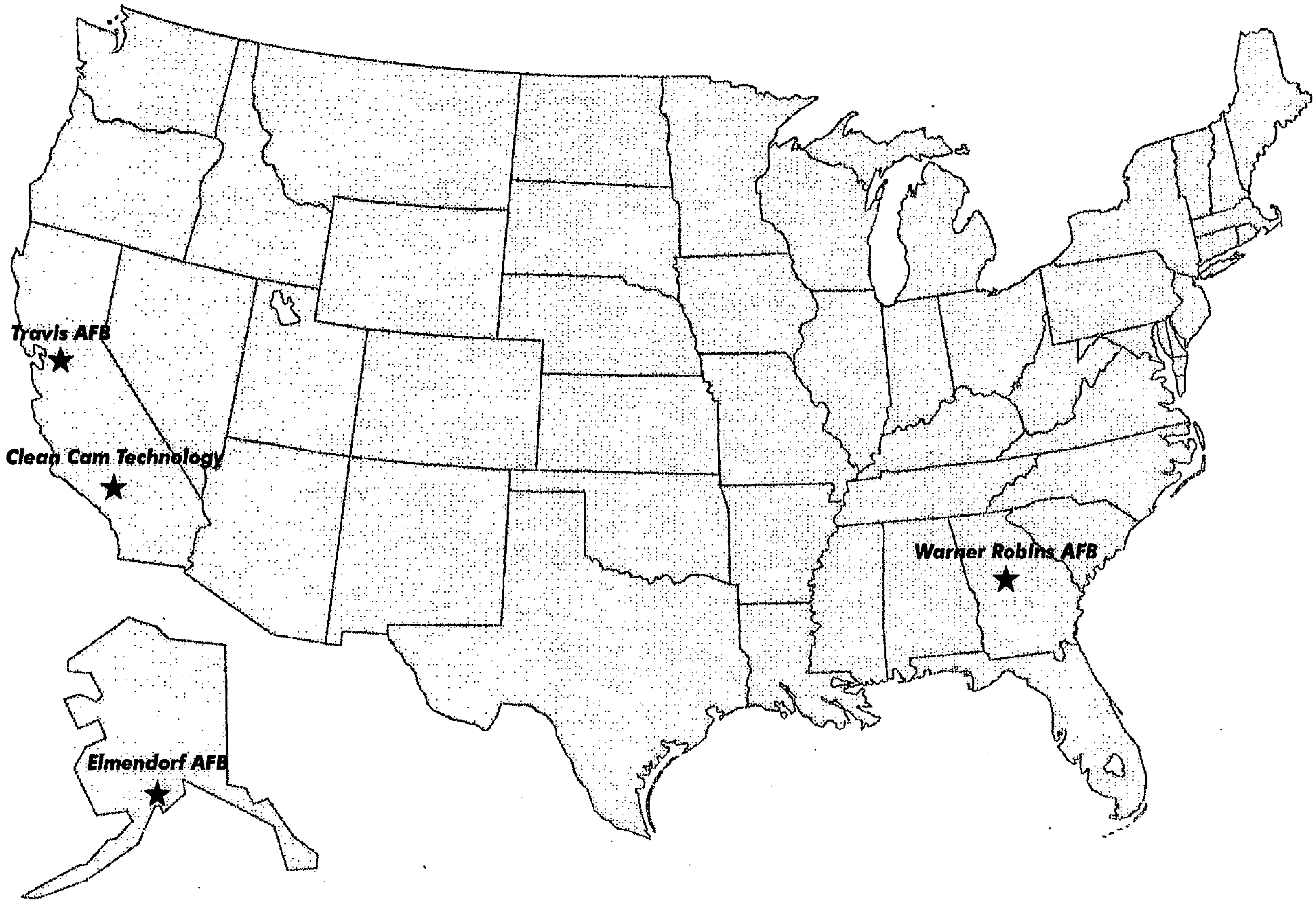

Figure 1-1. A/M 32A 86 Retrofit and Sampling Locations

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SECTION 2

AGE DESCRIPTION AND EMISSIONS SAMPLING LOCATIONS

2.1 AGE Description

The –86 generator, rated at 148 brake horsepower (at 2000 rpm), is powered by the 4L-71N internal-combustion engine manufactured by Detroit Diesel Corporation. The Model A/M32A–86 is a naturally aspirated, two-stroke cycle, four-cylinder engine that utilizes a muffler and a 2-inch by 3-inch oval exhaust pipe exiting the bottom of the unit in a horizontal direction (Figure 2-1). The stock diesel motor was removed and replaced by a CCT retrofitted motor. The retrofit included a modified cam shaft, fuel injector, turbo charger exhaust, and other proprietary modifications. The generator can be fueled on either diesel or JP-8 fuel. Diesel and JP-8 fuel were used during the emission measurement program at Travis AFB. One generator was operated on diesel fuel at Travis AFB because diesel is the primary fuel type for ground support equipment at the base. JP-8 fuel was used at Elmendorf AFB.

2.2 Sampling Locations

The –86 generator with the CCTS retrofit had a modified exhaust system that consisted of a muffler and a 4-inch-diameter exhaust pipe that exited horizontally at the bottom of the unit. A temporary exhaust duct was connected to the engine exhaust to facilitate emission measurement. The extension consisted of a 90-degree elbow from the exhaust into a vertical straight run, directing the flow from a horizontal direction to a vertical. The vertical extension provided one sampling location that was used for isokinetic sampling. This location was approximately 8 duct diameters (dd) downstream of the elbow. A second port was added to the vertical extension at a location 1 foot above the isokinetic port to provide access for a single-point sampling probe. Figure 2-2 is a photograph of the test configuration at Travis AFB.

Due to the need for additional sampling parameters, a second straight run was added to the existing extension that ran horizontally from the –86 exhaust to the elbow. The horizontal insulated section was of sufficient length to meet EPA Method 1A guidelines (at least 108 in. for

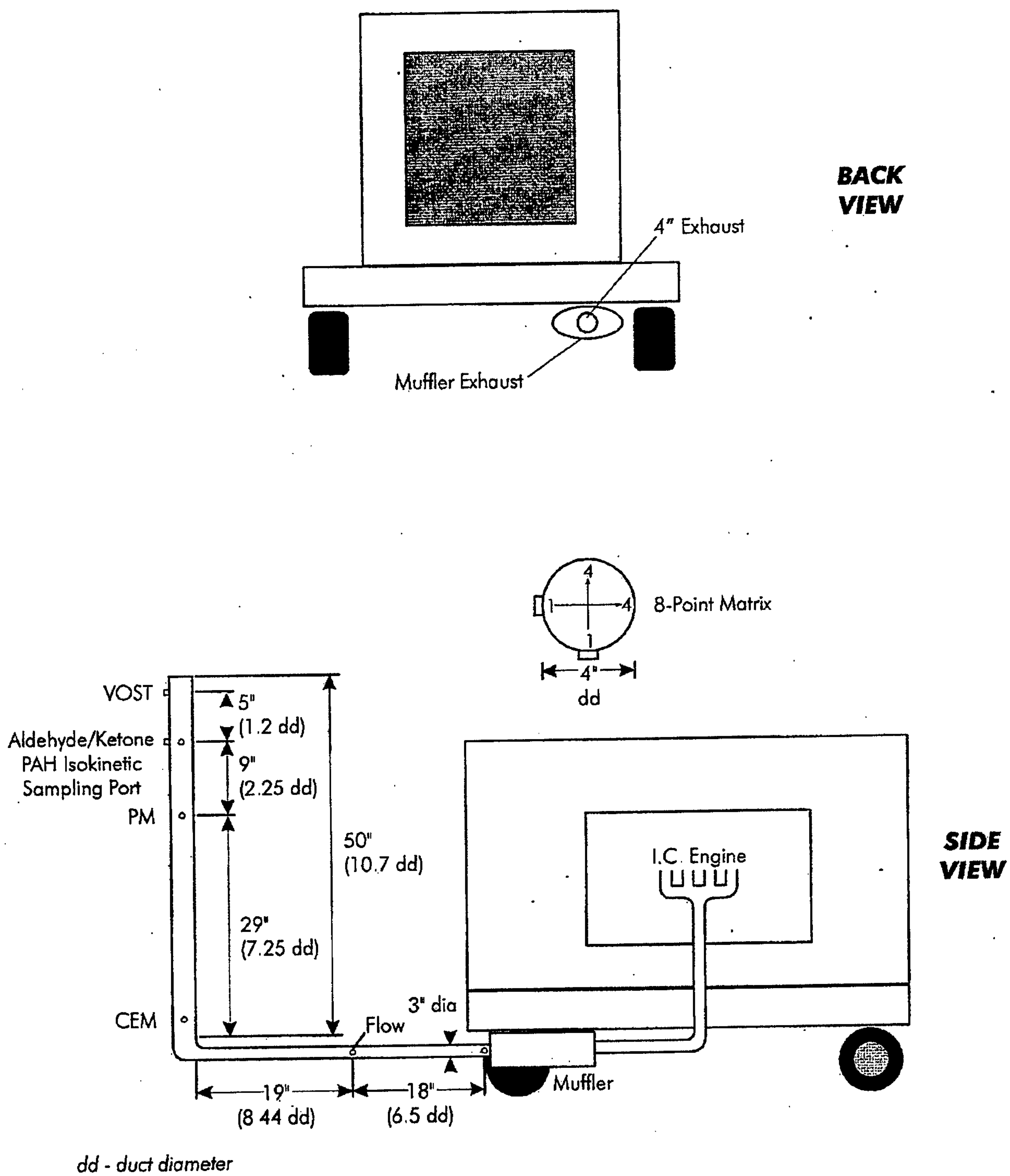

Figure 2-1. Schematic of -86 Stack Extension Modification

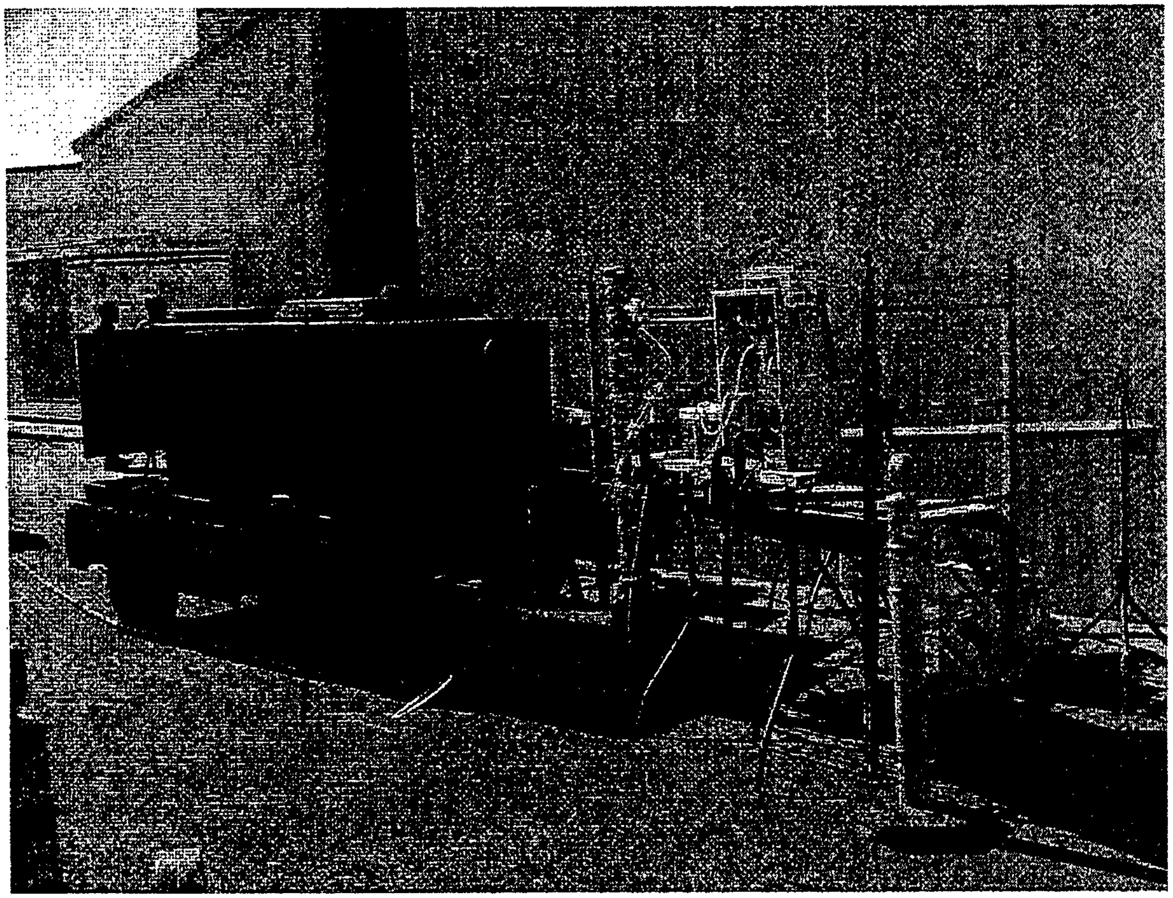

Figure 2-2. Photograph of Test Configuration at Travis AFB

sampling port locations in ducts less than 12 in. in diameter) so that additional sampling ports could be added for flow measurement. A second location for isokinetic sampling was added within the horizontal straight run, more than 2 dd downstream of the elbow and 8 dd upstream of the –86 exhaust terminus. The addition of the second isokinetic sampling location allowed simultaneous testing for PM and HAPs, thereby reducing field time.

Finally, EPA Method 1A was used to locate the velocity measurement points in the exhaust stack. Specifically, eight points, four on each of two perpendicular diameters, were used for velocity measurements. The velocity ports were ½-inch i.d. ports located more than 2 dd upstream of the extension's eblow and 2 dd downstream of the –86 exhaust.

SECTION 3

SAMPLING APPROACH

3.1 Engine Logistics

Warner Robins AFB personnel identified four Detroit Diesel Corporation 4L-71N diesel engines (used in the –86 AGE) and one complete AGE unit for use in this program. The four engines were shipped through Warner Robins AFB in Georgia to CCT in Bakersfield, California, for the retrofit. The complete AGE unit was shipped from Florida and was used as an example for the CCT personnel during the retrofit. Following the retrofit, two of the engines were shipped to Elmendorf AFB, Alaska. The remaining two engines were retrofitted and shipped to Travis AFB, California. Respective AGE personnel at each facility installed the engines in the –86 generators. The AGE remained in the field for approximately one year to note performance.

Table 3-1 outlines the sampling program and responsibilities.

3.2 Sampling Scenario

EQ traveled to each location during June 2002 to perform emission testing on the two retrofitted –86 AGE. During the emissions test program, AF personnel operated the generator and load bank to create specified loads. The AGE was operated at 10%, 25%, 50%, 75%, and 100% loading. At Travis AFB, one unit was operated on diesel fuel and one unit on JP-8 fuel. At Elmendorf AFB, the test unit was operated on JP-8 fuel. EQ personnel recorded the average load at approximately 15-minute intervals during each test run.

The first AGE at Travis and Elmendorf AFB was measured for PM including particle size distribution, NO_x, CO, TNMHC, O_2, CO_2, and HAPs. Three one-hour tests for these parameters were completed at each of the specified loads, with the exception of HAPs. The HAP sampling was conducted at each setting to provide one sample for the unit. Test duration was approximately 60 minutes based on historic non-retrofitted AGE data at each load setting.

TABLE 3-1. SAMPLING PROGRAM BREAKDOWN OF RESPONSIBILITIES

Phase	Responsibility	
	EQ	**Air Force Personnel**
Engine Logistics	• EQ contracted with CCT for retrofit of 4 engines • Shipped units from Clean Cam Technologies to Elmendorf AFB and Travis AFB	• Shipped the engines to Clean Cam Technologies for retrofit • Researched the availability of alternator kit and shipped with engines to CCT • Installed retrofitted engines into the –86 AGE
Emissions Testing	• Calibrated and operated sampling equipment (including manual methods and CEM methods) prior to and during testing • Sampled shipment and analysis of exhaust and JP-8 samples • Supplied external fuel tank • Maintained Quality Assurance/Quality Control procedures	• Provided modified stack extension • Operated AGE prior to and during testing • Fueled AGE prior to and during testing • Provided JP-8 fuel to operate AGE during emissions testing • Operated generator load bank to create and maintain 10%, 25%, 50%, 75% and 100% loads during testing • Recorded data on AGE operation during emissions testing • Provided assistance with fittings and means of connecting fuel tank to AGE
Schedule	• Scheduled testing during hot weather at each location; and tested two generators at Travis and one at Elmendorf	• Approved schedule
AGE Operational Performance	• Provided data sheets to AF to record operational data for subject year • Evaluated collected data and included in final summary report	• Provided list of operational and maintenance parameters to be tracked and documented for the retrofitted and control units • Operated retrofitted and control AGE and maintained records • Resolved operational problems as appropriate (CCT were contacted for assistance, as needed)
Reporting	• Completed monthly progress reports • Participated in quarterly conference calls, as required • Provided meeting minutes • Collected, assembled, and analyzed data and prepared final test results in electronic PDF format	• Participated in quarterly conference calls, as required

Based on previous sampling programs, it was anticipated that the primary HAPs of concern would be formaldehyde, benzene, toluene, ethylbenzene, xylene, and polycyclic organic compounds. Therefore, sampling for HAPs consisted of VOCs, aldehydes/ketones, and polynuclear aromatic hydrocarbons (PAH). One 4-hour composite test, consisting of 1-hour tests at each setting (from 10% to 75%), was completed for HAPs analysis at Elmendorf AFB. One 1-hour composite test for VOCs and PAHs and one 2-hour composite test for aldehydes/ketones were completed at Travis AFB. Testing for VOC and PAH consisted of 15 minutes at each setting (10% to 75%), and testing for aldehydes/ketones consisted of 30 minutes per setting. The sample time varied based on sampling rates and sample volume requirements

Following testing of the first AGE at Travis AFB, emissions from the second retrofitted AGE were measured for gaseous pollutants only (NO_x, CO, TNMHC, O_2, CO_2). Approximately 30 minutes of sample were collected at each of the five load settings. Sampling on the second generator at Elmendorf AFB was not completed due to operational difficulties with the retrofit engine.

See Table 3-2 for Sampling Outline.

3.3 Sampling Schedule

Sampling was completed at each AFB over approximately six 12-hour days, as follows:

- Day one: Travel.
- Day two: Equipment set up.
- Day three: First AGE tested at 10% and 25% load settings at Travis AFB. (First AGE tested at 10%, 25%, and 50% at Elmendorf AFB.)
- Day four: First AGE tested at 50% and 75% load settings at Travis AFB. (First AGE tested at 75% at Elmendorf AFB.)
- Day five: First AGE tested at 100% load setting; Second tested at 10%, 25%, 50%, 75%, and 100% load settings. (Only one unit tested at Elmendorf AFB.)
- Day six: Tear down and depart site.

Testing personnel arrived on site at least one hour prior to emissions test start-up time. Continuous emissions monitors (CEMs) were calibrated, and manual testing equipment was field checked. The AGE was fueled and started by AF personnel one-half hour before testing

TABLE 3-2. TARGET EXHAUST POLLUTANTS FOR EACH ENGINE SETTING

Load Setting	Sampling Duration	Particulate Matter	HAPs[a] (VOC, ALD/KET, PAH)	NO_x	TNMHC	CO	CO_2	O_2
Generator 1								
10%	3 hours (Three 1-hour test runs)	X	X	X	X	X	X	X
25%	3 hours (Three 1-hour test runs)	X	X	X	X	X	X	X
50%	3 hours (Three 1-hour test runs)	X	X	X	X	X	X	X
75%	3 hours (Three 1-hour test runs)	X	X	X	X	X	X	X
100%	3 hours (Three 1-hour test runs)	X	X	X	X	X	X	X
Generator 2								
10%	30-minute test runs			X	X	X	X	X
25%	30-minute test runs			X	X	X	X	X
50%	30-minute test runs			X	X	X	X	X
75%	30-minute test runs			X	X	X	X	X
100%	30-minute test runs			X	X	X	X	X

[a]The HAP samples were composite collected over each setting. At Travis AFB, approximately 30 minutes of sample per setting (10% to 75%) was collected for VOCs and PAHs resulting in a 2-hour sample duration. Approximately 15 minutes of sample was collected for aldehydes/ketones resulting in a 1-hour sample duration. At Elmendorf AFB, approximately one hour of sample was collected at each setting (from 10% to 75%) resulting in a 4-hour sample duration.

commenced. Testing at each load setting took approximately 4 hours; therefore, the three emissions tests at one load setting were completed in the morning, and three emission tests at the second setting completed in the afternoon. Following the final emissions test, EQ personnel recovered the samples, calibrated CEMs, and prepared for the following day's testing.

3.4 Fuel Consumption

Accurate measurement of JP-8 fuel use was imperative so that emission rates could be correlated with fuel consumption rates. Emission rates were then expressed in pounds of pollutant per thousand gallons of fuel consumed. Access to the fuel tank was difficult for the –86 generator. Therefore, an auxiliary 5-gallon (Travis AFB) and 15-gallon (Elmendorf AFB) container was used at each location to accurately measure fuel usage. Two differently sized fuel containers were used. During the first test program at Travis AFB, the fuel tank was refueled frequently and the fuel temperature was relatively high. Therefore, a larger fuel tank was used at Elmendorf AFB to reduce fuel temperature and reduce filling frequency. The fuel supply and return lines were attached directly into the auxiliary fuel tank. The fuel tank was placed on top of a platform balance with a sensitivity of 0.01 lb; weights were recorded at the beginning and end of each test run. When fuel was added during the test, it was supplied from the base main fuel supply, and the weight was recorded after each addition. In this way, the overall fuel consumption was accurately calculated. The temperature of the fuel was monitored during testing. Figures 3-1 and 3-2 note the external fuel tank specifications.

In order to minimize fuel measurement errors, the fuel feed and return lines were suspended above the external tank to eliminate errors in weight measurement caused by the fuel line mass.

3.5 AGE Operational Parameters

The AGE shop at each base maintained records on the operation of each retrofitted CCT generator and two non-retrofitted units (control units). Records were maintained as outlined in Table 3-3, and included: hours operated, maintenance performed, breakdowns, and any operational problems encountered by the units during the field demonstration. Provisions were made to allow the CCT Systems to perform on-site repairs and maintenance of the retrofitted

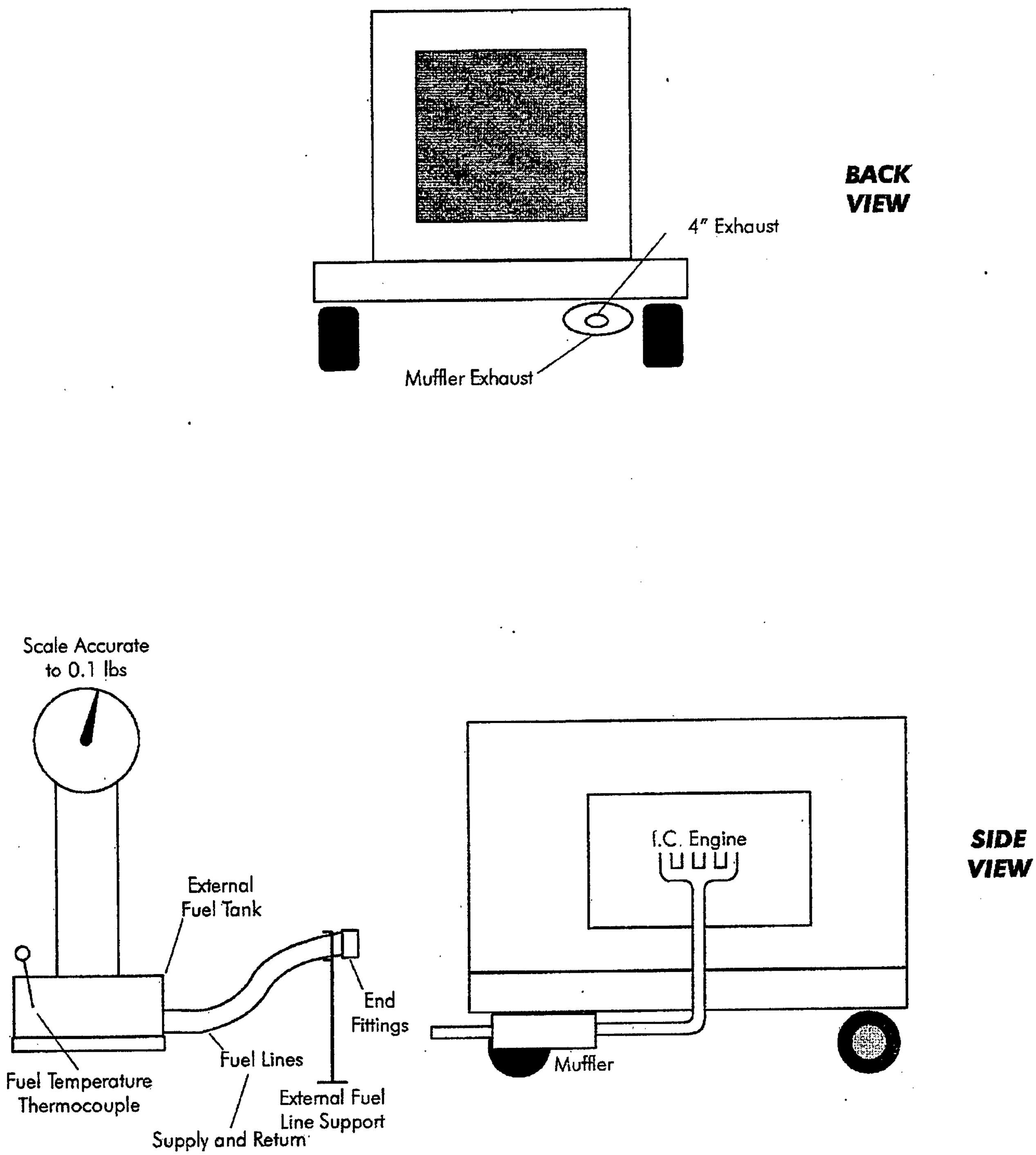

Figure 3-1. Schematic of Proposed External Fuel Tank

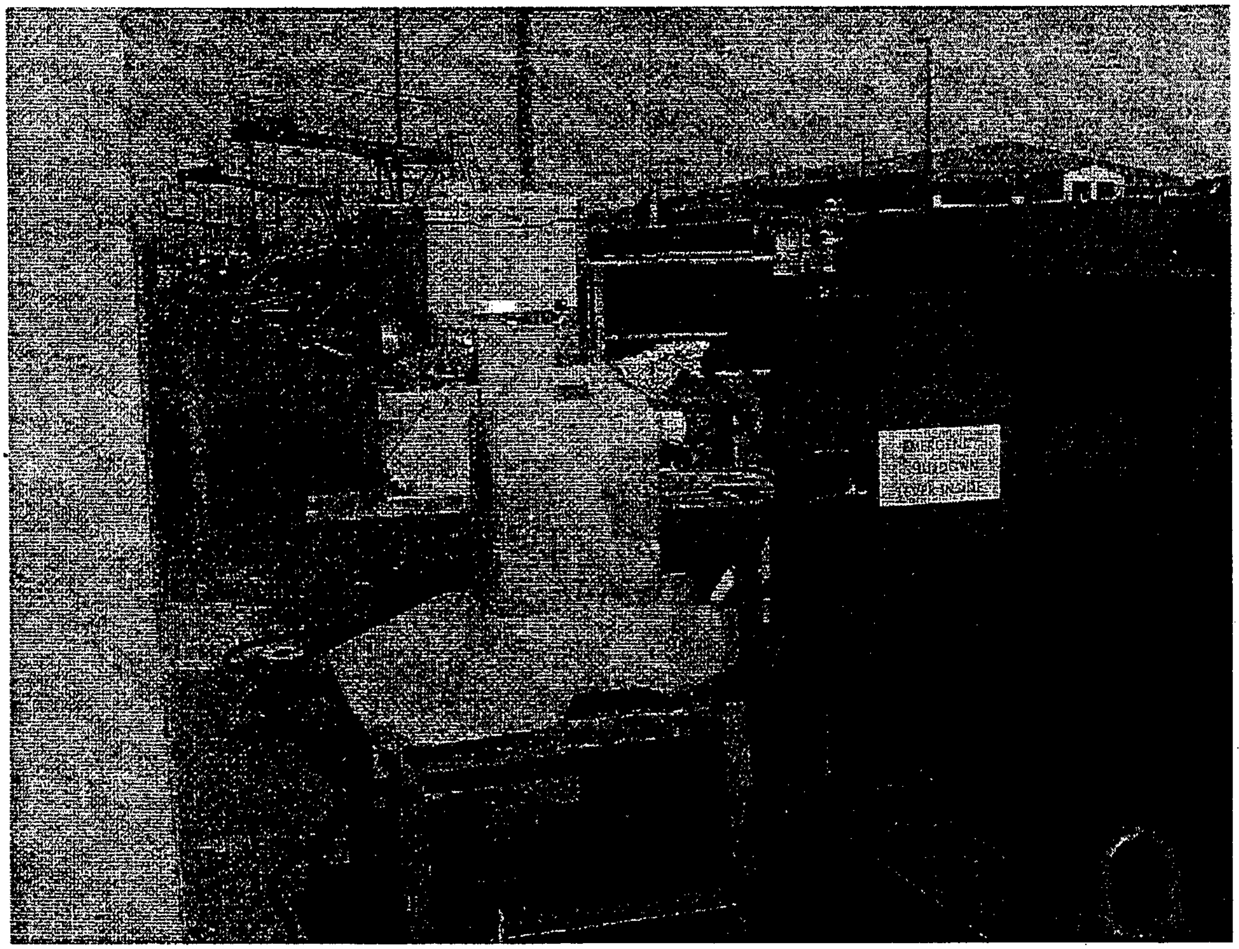

Figure 3-2. External Fuel Tank Photograph (Travis AFB)

TABLE 3-3. ASGE PERFORMANCE DATA LOG

Clean Cam Technology (CCT) Field Demonstration

Operational Record Keeping Log

Location: ________ Unit #: ________ Is Unit Equipped with CCT: ______ Field Trial Start Date: ______

Hours Operated/Hobbs Meter: Jan ______ Feb ______ Mar ______ Apr ______ May ______ June ______ July ______
Aug ______ Sep ______ Oct ______ Nov ______ Dec ______

Fuel Type: ______ Fuel Usage (Gallons): Jan ______ Feb ______ Mar ______ Apr ______ May ______ June ______ July ______ Aug
______ Sep ______ Oct ______ Nov ______ Dec ______

Typical Use (aircraft model, average load): Jan ______ Feb ______ Mar ______ Apr ______ May ______ June ______ July
______ Aug ______ Sep ______ Oct ______ Nov ______ Dec ______

Cooling Water Temperature: Jan ______ Feb ______ Mar ______ Apr ______ May ______ June ______
July ______ Aug ______ Sep ______ Oct ______ Nov ______ Dec ______

Oil Consumption: Jan ______ Feb ______ Mar ______ Apr ______ May ______ June ______
July ______ Aug ______ Sep ______ Oct ______ Nov ______ Dec ______

Standard Maintenance Service Date(s): ______ ______ ______ ______ ______
Describe Standard Maintenance: ______

Unscheduled Maintenance (describe required maintenance): ______

Did Unit Require Wet Stacking (provide dates): ______ ______, ______, ______,
______, ______, ______, ______, ______, ______, ______

General Comments on Unit Operation: ______

Other Comments: ______

units when problems occurred that could not be resolved by the AGE shop. The operational problems with each unit were summarized by each base and are provided in Appendix C.

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SECTION 4

TEST METHODOLOGY

This sample program involved sample collection from the exhausts of three retrofitted –86 AGE generators. The focus of the program was to verify reduction of engine emissions due to the CCT retrofit, and to assess the operational performance of the retrofitted –86 generator in the field. Emission sampling was completed at five load settings, during summer months, at each of the two AF bases where the AGE was in use. In order to minimize engine run time and program costs, the complete set of target pollutants was acquired at all five engine settings for one of the retrofitted generators at each location; emissions from the second generator at Travis AFB was monitored for gaseous pollutants only. The second unit at Elmendorf AFB (MG18) developed performance problems and testing could not be performed.

Sampling was completed for the following compounds at the engine exhaust:

- Oxygen and Carbon Monoxide (EPA Method 3A)
- Flow Rate and Moisture (EPA Methods 1-4)
- Filterable and Condensible Particulate (EPA Methods 5 and 202)
- Nitrogen Oxides (EPA Method 7E)
- Carbon Monoxide (EPA Method 10)
- HAPs: Characterized through VOCs (EPA Method 0030), Aldehydes and Ketones (EPA Method 0011), and polynuclear aromatic hydrocarbons (NIOSH Method 5506)
- Total Non-Methane Hydrocarbons (TNMHC) as Total Hydrocarbons (THC) and Methane (EPA Method 25A)

The engine exhaust was not sampled for sulfur dioxide, metals, or semi-volatiles. The entire list of target pollutants was sampled for one unit, and the gaseous pollutants were sampled from the second unit.

4.1 Exhaust Emission Test Methods

4.1.1 Stack Gas Volumetric Flow Rate

EPA Method 2A, "Determination of Stack Gas Velocity and Volumetric Flow Rates," was used to determine stack gas volumetric flow rates. Standard pitot tubes meeting the EPA specifications and an inclined manometer were used to measure velocity pressures. A calibrated Type "K" thermocouple was used to measure stack gas temperature. The stack gas velocity was calculated from the average square root of the stack gas velocity pressure, average stack gas temperature, stack gas molecular weight, and absolute static pressure. The volumetric flow rate was the product of velocity and stack cross-sectional area. The velocity measurements were made in the horizontal exhaust extension upstream of the sampling trains to avoid any flow disturbances.

4.1.2 Carbon Dioxide and Oxygen

EPA Method 3A was used to measure the concentration of CO_2 and O_2 in the stack gas. A zirconium oxide-based analyzer was calibrated with zero and three calibration gases before each test day. The calibration gases had concentrations of approximately 40% and 80% of the full-scale response of the analyzer. At the end of each sampling period, the analyzer was challenged with a zero and an upscale calibration gas. The calibration gasses were EPA Protocol ($\pm$2%) gases. The analyzer operated continuously through each of the test runs.

4.1.3 Stack Gas Moisture Content

EPA Reference Method 4, "Determination of Moisture Content in Stack Gases," was used to determine the moisture content of the exhaust. This method was conducted as part of each particulate measurement run. The initial and final contents of all impingers was determined gravimetrically.

4.1.4 Particulate Sampling

EPA Method 5, "Determination of Particulate Emissions from Stationary Sources," was used to determine filterable particulate matter, and EPA Method 202 was used to determine condensable (back-half), organic, and inorganic particulate matter. The sampling train consisted of a heated glass-lined probe, heated glass-fiber filter, and a series of impingers followed by a

vacuum pump, dry gas meter, and calibrated orifice. The filter temperature was maintained between 223° and 273°F. Thermocouples were used to monitor temperatures of the stack gas, sample probe, filter, and impinger exit gas.

For each load setting, one particulate sample was analyzed by scanning electron microscopy (SEM) equipped with an iridium X-ray fluorescence (IXRF) digital image system to determine the particulate size distribution by count and the aerodynamic particle shape. The EPA Method 5 filter media was modified for SEM analysis. A polycarbonate filter media was used after discussion with the analytical laboratory. The filter media chosen was based on the intent of gaining the highest possible quantity of measurable particulate matter.

4.1.5 Nitrogen Oxides (NO_x)

EPA Reference Method 7E, "Determination of Nitrogen Oxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)," was employed. EQ used a chemiluminescent NO_x analyzer, manufactured by Thermo Environmental Instruments, for nitrogen oxide emission monitoring. The NO_x analyzer was operated continuously during each sampling test run. A zero and three calibration gases for the NO_x analyzer were used prior to the initial test run and at the end of each one-hour sampling period. The calibration gases were EPA Protocol calibration gases.

A stainless steel probe with a three-way valve on the exit end was inserted directly into the stack with a heated Teflon sample line attached to one side of the valve, and the calibration gas line attached to the other side. A conditioning system was attached to the exit end of the heated line for moisture removal. An unheated Teflon line connected the conditioning system and the analyzer. The same heated system was used to manifold stack and calibration gas to the NO_x and CO analyzers.

4.1.6 Carbon Monoxide (CO)

The CO concentration was measured by EPA Method 10. The CO sampling system used the same sampling system as described for the NO_x sampling system, plus a sample pump and a TECO Model 48 CO analyzer. The analyzer was calibrated with EPA Protocol calibration standards, and results were charted on a strip chart recorder.

4.1.7 Aldehydes and Ketones

The sampling train utilized to perform aldehyde and ketone sampling conformed to EPA Method 0011. A single composite sample run was collected over multiple engine loads.

4.1.8 Volatile Organic Compounds (VOCs)

EPA Method 0030, "Determination of Volatile Principal Organic Hazardous Constituents," was used to measure volatiles from the generator exhaust. A 20-liter exhaust gas sample was collected at a constant rate of 0.07 lpm. A volatile organic sampling train (VOST) was used consisting of a glass-lined probe, a series of resin traps, and a condensate container. A single sample was collected over multiple engine load settings. Table 4-1 notes the target compounds.

4.1.9 Polynuclear Aromatic Hydrocarbons (PAH)

National Institute of Occupational Safety and Health (NIOSH) Method 5506 was used to collect a sample for the target pollutants shown in Table 4-2. A sample was drawn through an in-stack filter across an XAD-2 resin trap at approximately 1 lpm. A single sample was collected over multiple engine load settings.

4.1.10 Total Non-Methane Hydrocarbons (TNMHC)

EPA Method 25A, "Determination of Total Hydrocarbons using a Flame Ionization Analyzer," was used to measure the TNMHC emissions. Stack gases were withdrawn via a stainless steel in-stack probe and heated (250°F) Teflon sample line, and delivered to the flame ionization detector (FID) with a heated sample pump. The analyzer, via an internal pumping system, withdrew the gas from the stack. Once inside the analyzer, the gas stream was split; a portion of the system was directed to an FID identical to the inlet, and a portion was directed to a proprietary-design non-methane hydrocarbon cutter. The cutter oxidized all hydrocarbons except methane. The methane-containing gas stream was then sent to an FID that determined the methane concentration. The response from each detector was converted to an analog signal (voltage) and recorded using a data acquisition system.

The analyzer was calibrated prior to, and at the conclusion of, each test run by using EPA Protocol 1 Calibration Gases.

TABLE 4-1. SUMMARY OF SOURCE TARGET COMPOUNDS FOR VOLATILE ORGANIC COMPOUNDS (EPA Method 0030)

VOST Compounds	
Acetone	1,2-Dichloropropane
Benzene	1,3-Dichloropropane
Bromobenzene	2,2-Dichloropropane
Bromochloromethane	Cis-1,3-Dichloropropene
Bromodichloromethane	Trans-1,3-Dichloropropene
Bromoform	1,2-Dichloropropene
Bromomethane	Ethylbenzene
1,3-Butadiene	Hexachlorobutadiene
2-Butanone	2-Hexanone
n-Butylbenzene	Isopropylbenzene
Sec-Butylbenzene	p-Isopropyltoluene
Tert-butylbenzene	Methylene chloride
Carbon disulfide	4-Methyl-2-pentanone
Carbon tetrachloride	Naphthalene
Chlorobenzene	n-Propylbenzene
Chlorodibromomethane	Styrene
Chloroethane	1,1,1,2-Tetrachloroethane
Chloroform	1,1,2,2-Tetrachloroethane
Chloromethane	Tetrachloroethene
2-Chlorotoluene	Toluene
4-Chlorotoluene	1,2,3-Trichlorobenzene
1,2-Dibromo-3-chloro-propane	1,2,4-Trichlorobenzene
1,2-Dibromoethane	1,1,1-Trichloroethane
Dibromoethane	1,1,2-Trichloroethane
1,2-Dichlorobenzene	Trichloroethene
1,3-Dichlorobenzene	Trichlorofluoromethane
1,4-Dichlorobenzene	1,2,3-Trichloropropane
Dichlorodifluoromethane	1,2,4-Trimethylbenzene
1,1-Dichloroethane	1,3,5-Trimethylbenzene
1,2-Dichloroethane	Vinyl chloride
Cis-1,2-Dichloroethane	m-Xylene & p-Xylene
Trans-1,2-Dichloroethane	o-Xylene
1,1-Dichloroethane	

TABLE 4-2. TARGET POLYNUCLEAR AROMATIC HYDROCARBONS (PAH) (NIOSH METHOD 5506)

Polynuclear Aromatic Hydrocarbons	
Naphthalene	Chrysene
Acenaphthylene	Benzo[b]fluoranthene
Acenaphthene	Benzo[k]fluoranthene
Fluorene	Benzo[a]pyrene
Anthacene	Benzo[e]pyrene
Phenanthrene	Benzo[ghi]perylene
Fluoroanthene	Indeno[1,2,3-cd]pyrene
Pyrene	Dibenz[a,h]anthracene
Benz[a]anthracene	

A methane response factor for the analyzer was obtained by introducing a methane calibration gas to the calibrated J.U.M. 109A analyzer. The calibration gas value for methane and its relationship to the response of the THC analyzer yields the methane response factor. The response factor was divided into the average methane concentration determined during sampling on the analyzer to allow the methane results to be calculated as methane. The methane content, as methane, was then subtracted from the THC measured to determine the total non-methane THC, as methane.

4.2 Fuel Analysis

One composite fuel sample was taken from each AGE during emission testing. Fuel samples were collected from the fuel supply line and analyzed for the parameters listed in Table 4-3.

TABLE 4-3. FUEL ANALYSIS

Analyte	Analytical Method
Sulfur (%)	ASTM D 5453
Carbon (%)	ASTM D 5291
Nitrogen (%)	ASTM D 4629
Hydrogen (%)	ASTM 5291
Ash (%)	ASTM D 482
Aromatics	PONA Analysis
Paraffins	PONA Analysis
Olefins	PONA Analysis
Naphthenes	PONA Analysis
Btu/lb	ASTM D 240

SECTION 5

RESULTS

The purpose of this testing effort was to determine the long-term performance of the CCT retrofitted –86 generator. Prior to approving the CCT modification for general AF use, the AF needed to demonstrate that retrofitting did not negatively affect the operational performance of the unit and that the CCT reduced emissions to an acceptable level.

In order to complete these objectives, emissions from two retrofitted –86 Generators A and B (DG87 and DG76 respectively) were measured during a visit to Travis AFB, and emissions from one retrofitted –86 Generator A (MG13) was measured at Elmendorf AFB in June 2002. Unit MG18 at Elmendorf AFB had operational problems that prevented emission testing. Specifically, the testing program assessed emissions of criteria pollutants including PM, with particulate sizing, NO_x, CO, TNMHC, and select HAPs through VOC, PAH, and aldehyde/ketone sampling. Particulate and HAP data was collected for DG87 and MG13 only. In conjunction with these tests, stack gas flow rate, temperature, composition (CO_2 and O_2), and moisture were measured.

These parameters were measured at five specified loads: 10%, 25%, 50%, 75%, and 100%. A load bank (an artificial load comprised of heating coils) provided the resistance necessary for AGE operation at the specified loads.

The JP-8 and diesel fuel used during the testing were sampled and analyzed for: percent sulfur, carbon, nitrogen, hydrogen, ash, aromatics, paraffins, olefins, naphthenes, and Btu per pound to compare with the specifications for these fuels.

The operational performance of the retrofitted units was evaluated by AGE personnel at each base.

5.1 EPA Tier 2 Pollutants

Emissions were collected directly from the engine's tailpipe through an exhaust stack. The results of the sampling at each AFB base are provided in the following sections. Table 5-1 illustrates a summary of trends of average emission factors for each pollutant at each load setting, at

both bases, and operated with diesel fuel instead of JP-8. Additional detail including emission results from individual runs, horsepower, and fuel usage is provided for each load setting in Tables 5-2 through 5-6.

5.1.1 Horsepower Calculations

During the emission test program, specific engine parameters were monitored to note engine performance. Facility personnel were responsible for collecting and maintaining the operating data and for operating the engine in a safe manner. Select engine operation parameters (including load setting, horsepower, and fuel usage) are included in Tables 5-2 through 5-6.

Accurate measurement of fuel use was imperative so that emission rates could be correlated with fuel consumption rates, expressed in pounds of pollutant per thousand gallons of fuel consumed. In addition, horsepower could not be measured directly. Therefore, horsepower was calculated by multiplying the fuel usage by a brake-specific fuel consumption factor (BSCF) that was equal to the fuel usage measured by Southwest Research Institute during previous testing efforts divided by the brake horsepower (BHP). This calculation, provided by CCT and reviewed by USAF personnel, allowed the emission rates to be correlated with horsepower, expressed as grams per horsepower hour (g/hp-hr). This data could then be compared directly with EPA's Tier 2 standards for non-road engines (as discussed in Section 5.1.5).

Calculated horsepower averaged from 18.07 to 17.45 at 10%, 42.43 to 41.98 at 25%, 87.28 to 78.30 at 50%, 124.79 to 106.31 at 75%, and 127.46 to 143.49 at 100% load settings at Travis AFB and Elmendorf AFB respectively. Fuel usage averaged about 3 gal/hr, 4 gal/hr, 5 gal/hr, 6 to 7 gal /hr, and 7 to 8 gal/hr at 10%, 25%, 50%, 75%, and 100%, respectively.

5.1.2 Gaseous Emissions

Tables 5-1 through 5-6 present the gaseous emissions data collected at the five power settings (100%, 75%, 50%, 25%, and 10%) at which the generator was operated during testing.

In general, gaseous pollutant emission factors for NO_x, CO, and NMHC reported as lbs/gal remained consistent across the five power settings. However, emission factors in g/hp-hr decreased by one-half to one-third as operation was increased from a load settting of 10% to 25%, and decreased again by a similar factor from 25% to 50%. Emission factors for NO_x and CO then remained fairly consistent from the 50% to 100% load settings while NMHC continued

to decrease significantly as power increased. Percent CO_2 increased and percent O_2 decreased as the load setting increased from 10% to 100%.

Gaseous pollutant emission factors for NO_X and CO were fairly consistent when compared from engines operated with diesel fuel versus those operated with JP-8 fuel. However, NMHC emission factors almost doubled when the engines were operated with JP-8 fuel. Percent CO_2 increased and percent O_2 remained comparable when the engine was operated with diesel and with JP-8. It was noted in the field that Unit DG76 had difficulty maintaining load and experienced high operating temperatures. This may contribute to the variance in emissions.

Overall gaseous results were similar at Travis AFB and Elmendorf AFB.

5.1.3 Particulate

Testing for particulate emissions was completed on one engine at Travis AFB and one at Elmendorf AFB (DG87 and MG13). Particulate emission factors in lbs/gal decreased slightly from the 10% load setting to the 75% load setting and then decreased by about two-thirds from the 75% load setting to the 100% load setting. Particulate emission factors expressed in g/hr-hr behaved similar to the NO_X, CO, and NMHC emission factors, approximately halving from the 10% to 25% load setting, and again from the 25% to 50% load setting. Tables 5-1 through 5-6 provide detailed results.

During the second PM test run, the filter media consisted of a polycarbonate material to allow for improved particle characterization by scanning electron microscopy. Each test run that used this material gained approximately twice the particulate mass as the other test runs. A review of the data determined that the mass gained, but not the particle distribution, was compromised by the filter material. These runs were not included in the PM average but are provided for review.

5.1.4 Particulate Characterization

During one run at each setting (Run 2), a particle sample was collected on a polycarbonate filter for analysis via scanning electron microscopy to count the particles in each size range. The results of the particle counts are provided in Table 5-7. Data was insufficient for particle sizing for all but the 100% setting at Travis AFB (DG87), and for the 10% and 25% settings at Elmendorf AFB (MG13). The particle loading was determined to be too high to allow for accurate analysis. The analysis for the remaining runs determined that the majority of particulate matter (>99%) was below 10 microns in size, with >94% of the particles at a diameter below 2.5 microns.

The distribution of the particles by mass was less consistent. As the load increased from 25% to 50% to 100% at Elmendorf AFB, the mass of particles less than 2.5 microns increased from 15% to 47% to 100%, respectively. However, at Travis AFB, the mass of particles less than 2.5 microns was only 36% at the 100% load setting.

5.1.5 Comparison to EPA Tier 2 Non-road Standards

Results from the five load settings were weighted based on the quantity of time spent at each load setting (ISO 8178-4 "D2") and compared to EPA Tier 2 Non-Road standards (Table 5-8). Previous testing completed at Southwest Research Institute in San Antonio, Texas (June 1998) demonstrated that the CCT retrofit reduced NO_X emissions by 76%, CO and THC emissions by 43%, and PM by 32% when compared to non-retrofit generators. However, the current data did not support this finding. Testing illustrated non-compliance with Tier 2 for the combined NO_X+NMHC standard of 4.9 g/hp-hr for the three generators. All three generators were well within the CO standard of 3.7 g/hp-hr. However, none of the generators were able to meet the PM standard of 0.22 g/hp-hr, with results approximately double the standard.

5.2 Hazardous Air Pollutants (HAPs)

Emissions of HAPs were quantified from two generators: DG87 at Travis AFB and MG13 at Elmendorf AFB. This was accomplished by collecting a composite sample over four engine load settings (10% through 75%) for VOCs, PAHs, and aldehydes/ketones, those parameters that featured most prominently in past sampling episodes. An overall HAP emission factor was calculated for each generator. The HAP emission factor from Generator DG87, tested at Travis AFB, was almost one-third that of the emission factor from Generator MG13, tested at Elmendorf AFB. Diesel fuel was used to operate DG87 during testing, while JP-8 was used to fuel MG13. See Table 5-9 for a detailed breakdown of detected HAPs.

5.2.1 Volatile Organic Compounds (VOC)

Speciation of VOC from a composite sample over the 10% load setting to the 75% load setting was performed for one engine at each AFB (DG87 and MG13). The detected compounds were similar to the speciated HAPs determined in historical test programs. These HAPs were naphthalene, benzene, toluene, ethylbenzene, xylene, styrene, bromomethane, and chloromethane,

all of which were detected in the exhaust stream. The portion of the HAP emission factor contributed by VOC was approximately 80%; benzene, toluene, and xylene were most prominent. A summary of the volatile emissions is provided in Table 5-10.

5.2.2 PAH

At Elmendorf AFB, a PAH composite sample over engine load settings of 10% through 75% was collected for Generator A (DG 87) and for Generator A (MG13). Approximately 8% of the total HAP emission factor was comprised of PAH. All other compounds were non-detect above 2 μg. See Table 5-11 for more detailed information on PAH emissions.

5.2.3 Aldehyde/Ketone

A composite aldehyde/ketone sample was collected for DG87 and MG13 over engine load settings 10% through 75%. Aldehyde/ketones contributed approximately 12% of the total HAP emission factor for both engines. See Table 5-12 for more detailed aldehyde/ketone emission information.

5.4 Engine Operational Performance

When the motor was installed by Elmendorf AFB, several problems were immediately noted. The turbo drain line was too close to the exhaust exit, the ether bottle could not be mounted in its original location, and the exhaust exit was routed downward and too close to the hand brake. Elmendorf AFB worked with CCT to resolve these problems. Once the motor was operating, Elmendorf noted additional problems and sent an electronic video to CCT for review. Based on the video, CCT identified the problems, modified the fuel control rack and injector, and shipped the parts to Elmendorf. After additional difficulties, CCT conducted dynometer research and determined that the generator could not operate properly with the turbo in the modified location. The units were then returned from Elmendorf AFB to CCT. The turbo chargers were re-routed to the original position and returned to Elmendorf AFB. The generators provided to Travis AFB were modified based on these initial operational problems.

However, additional operating difficulties with respect to the turbo boost were noted in July 2002. Air Force personnel worked with CCT to resolve these problems. In December

2003, Travis AFB noted that the generator had difficulty operating on JP-8 fuel. Additionally, the units at Elmendorf AFB were experiencing several maintenance problems.

Based on the operational difficulties encountered by both bases during the test period, it was decided that the program was no longer feasible and additional emissions testing was cancelled.

TABLE 5-1. A/M32-86
EMISSION FACTOR SUMMARY

		Load Setting									
		10%		25%		50%		75%		100%	
Pollutant	Unit	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr
NO_x											
	DG87	0.13	9.75	0.13	5.11	0.11	3.28	0.15	3.84	0.17	4.28
	DG76	0.16	11.98	0.14	5.56	0.13	3.75	0.15	3.74	0.16	3.93
	MG13	0.12	9.66	0.12	4.87	0.13	3.87	0.14	3.64	0.18	4.34
CO											
	DG87	4.25E-02	3.19	3.55E-02	1.41	2.55E-02	0.75	3.07E-02	0.79	3.20E-02	0.79
	DG76	7.03E-02	5.28	5.40E-02	2.14	4.14E-02	1.22	3.82E-02	0.98	3.56E-02	0.88
	MG13	5.16E-02	4.03	3.81E-02	1.51	2.98E-02	0.88	3.79E-02	0.97	7.35E-02	1.82
NMHC											
	DG87	1.54E-02	1.15	9.81E-03	3.89E-01	7.15E-03	0.21	5.80E-03	0.15	3.51E-03	8.68E-02
	DG76	2.49E-02	1.87	1.85E-02	0.74	1.16E-02	0.34	8.75E-03	0.22	6.03E-03	0.15
	MG13	2.47E-02	1.93	1.85E-02	0.74	1.05E-02	0.31	6.85E-03	0.18	5.37E-03	0.13
PM											
	DG87	1.47E-02	1.10	1.31E-02	0.52	1.02E-02	0.30	1.16E-02	0.30	7.71E-03	0.19
	DG76	na	na	na	na	na	na	na	na	na	na
	MG13	1.51E-02	1.13	1.27E-02	0.51	1.17E-02	0.34	1.35E-02	0.35	1.57E-02	0.39
CO_2											
	DG87	3.22		3.98		4.92		5.98		7.00	
	DG76	3.28		3.96		5.33		6.00		6.35	
	MG13	3.30		4.16		5.88		6.63		6.94	
O_2											
	DG87	16.58		15.53		14.18		12.73		11.36	
	DG76	16.51		15.53		13.61		12.70		12.23	
	MG13	16.52		15.21		12.84		11.94		11.32	

Notes:
- DG87 and DG76 (Generators A and B) were tested at Travis AFB; MG13 (Generator A) was tested at Elmendorf AFB
- DG87 was operated on diesel fuel during testing; DG76 and MG13 were operated on JP-8
- Results presented are the average of three runs.
- Only gaseous pollutants were measured from Unit DG76.
- PM results represent the total particulate matter (filterable and inorganic condensibles).

TABLE 5-2. A/M32–86
EMISSION FACTOR SUMMARY

TRAVIS AFB - 10% LOAD

Run No.	Unit No.	Fuel usage, gal/hr	Calculated hp	NO_X lbs/gal	NO_X g/hp-hr	CO lbs/gal	CO g/hp-hr	NMHC lbs/gal	NMHC g/hp-hr	PM lbs/gal	PM g/hp-hr	CO_2 %	O_2 %
1	DG87	2.98	18.03	0.12	8.93	0.04	3.01	0.01	1.12	0.01	1.01	3.12	16.70
2	DG87	2.81	17.01	0.14	10.23	0.04	3.20	0.02	1.19	0.03	2.28 (a)	3.21	16.59
3	DG87	2.86	17.31	0.13	10.11	0.04	3.37	0.02	1.15	0.02	1.20	3.34	16.45
Avg.	DG87	2.88	17.45	0.13	9.75	0.04	3.19	0.02	1.15	0.01	1.10	3.22	16.58
1	DG76	2.88	17.45	0.16	11.98	0.07	5.28	0.02	1.87	na	na	3.28	16.51

(a) Run 2 not included in PM average.

ELMENDORF AFB - 10% LOAD

Run No.	Unit No.	Fuel usage, gal/hr	Calculated hp	NO_X lbs/gal	NO_X g/hp-hr	CO lbs/gal	CO g/hp-hr	NMHC lbs/gal	NMHC g/hp-hr	PM lbs/gal	PM g/hp-hr	CO_2 %	O_2 %
1	MG13	3.00	18.14	0.15	11.01	0.06	4.73	0.03	2.17	0.01	1.11	3.31	16.51
2	MG13	3.69	19.23	0.10	8.34	0.04	3.51	0.02	1.76	0.02	2.12 (a)	3.31	16.52
3	MG13	2.78	16.84	0.13	9.62	0.05	3.85	0.02	1.86	0.02	1.15	3.28	16.53
Avg.	MG13	3.16	18.07	0.12	9.66	0.05	4.03	0.02	1.93	0.02	1.13	3.30	16.52

(a) Run 2 not included in PM average.

TABLE 5-3. A/M32–86
EMISSION FACTOR SUMMARY

TRAVIS AFB - 25% LOAD

Run No.	Unit No.	Fuel usage, gal/hr	Calculated hp	NO_X lbs/gal	NO_X g/hp-hr	CO lbs/gal	CO g/hp-hr	NMHC lbs/gal	NMHC g/hp-hr	PM lbs/gal	PM g/hp-hr	CO_2 %	O_2 %
1	DG87	3.46	39.57	0.14	5.54	0.04	1.45	0.01	0.44	0.01	0.52	3.96	15.54
2	DG87	3.81	43.54	0.12	4.89	0.03	1.36	0.01	0.37	0.03	1.28 (a)	3.96	15.54
3	DG87	3.74	42.82	0.12	4.89	0.04	1.42	0.01	0.36	0.01	0.52	4.01	15.52
Avg.	DG87	3.67	41.98	0.13	5.11	0.04	1.41	0.01	0.39	0.01	0.52	3.98	15.53
1	DG76	3.67	41.98	0.14	5.56	0.05	2.14	0.02	0.74	na	na	3.96	15.53

(a) Run 2 not included in PM average.

ELMENDORF AFB - 25% LOAD

Run No.	Unit No.	Fuel usage, gal/hr	Calculated hp	NO_X lbs/gal	NO_X g/hp-hr	CO lbs/gal	CO g/hp-hr	NMHC lbs/gal	NMHC g/hp-hr	PM lbs/gal	PM g/hp-hr	CO_2 %	O_2 %
1	MG13	3.75	42.84	0.12	4.81	0.04	1.52	0.02	0.75	0.01	0.48	4.15	15.23
2	MG13	3.69	42.18	0.12	4.92	0.04	1.53	0.02	0.76	0.03	1.04 (a)	4.16	15.20
3	MG13	3.70	42.26	0.12	4.88	0.04	1.49	0.02	0.70	0.01	0.53	4.16	15.20
Avg.	MG13	3.71	42.43	0.12	4.87	0.04	1.51	0.02	0.74	0.01	0.51	4.16	15.21

(a) Run 2 not included in PM average.

TABLE 5-4. A/M32–86
EMISSION FACTOR SUMMARY

TRAVIS AFB - 50% LOAD

Run No.	Unit No.	Fuel usage, gal/hr	Calculated hp	NO_X		CO		NMHC		PM		CO_2	O_2
				lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	%	%
1	DG87	5.02	77.57	0.11	3.28	0.02	0.73	0.01	0.21	0.01	0.28	4.90	14.24
2	DG87	5.28	81.59	0.11	3.13	0.02	0.72	0.01	0.21	0.02	0.59 (a)	4.94	14.16
3	DG87	4.91	75.76	0.12	3.43	0.03	0.80	0.01	0.22	0.01	0.32	4.93	14.16
Avg.	DG87	5.07	78.30	0.11	3.28	0.03	0.75	0.01	0.21	0.01	0.30	4.92	14.18
1	DG76	5.07	78.30	0.13	3.75	0.04	1.22	0.01	0.34	na	na	5.33	13.61

(a) Run 2 not included in PM average.

ELEMENDORF AFB - 50% LOAD

Run No.	Unit No.	Fuel usage, gal/hr	Calculated hp	NO_X		CO		NMHC		PM		CO_2	O_2
				lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	%	%
1	MG13	5.52	85.21	0.15	4.27	0.03	0.98	0.01	0.36	0.01	0.35	5.79	12.94
2	MG13	5.57	86.01	0.13	3.72	0.03	0.82	0.01	0.32	0.03	0.94 (a)	5.86	12.89
3	MG13	5.87	90.64	0.12	3.62	0.03	0.82	0.01	0.25	0.01	0.34	5.98	12.70
Avg.	MG13	5.65	87.28	0.13	3.87	0.03	0.88	0.01	0.31	0.01	0.34	5.88	12.84

(a) Run 2 not included in PM average.

TABLE 5-5. A/M32–86 TAILPIPE EXHAUST STACK EMISSION FACTOR SUMMARY

TRAVIS AFB - 75% LOAD

Run No.	Unit No.	Fuel usage, gal/hr	Calculated hp	NO_X		CO		NMHC		PM		CO_2	O_2
				lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	%	%
1	DG87	5.65	99.75	0.16	4.04	0.03	0.82	0.01	0.17	0.01	0.31	5.88	12.83
2	DG87	6.33	111.81	0.14	3.67	0.03	0.74	0.01	0.14	0.02	0.60 (a)	6.00	12.72
3	DG87	6.08	107.38	0.15	3.82	0.03	0.80	0.01	0.14	0.01	0.29	6.05	12.65
Avg.	DG87	6.02	106.31	0.15	3.84	0.03	0.79	0.01	0.15	0.01	0.30	5.98	12.73
1	DG76	6.02	106.31	0.15	3.74	0.04	0.98	0.01	0.22	na	na	6.00	12.70

(a) Run 2 not included in PM average.

ELMENDORF AFB - 75% LOAD

Run No.	Unit No.	Fuel usage, gal/hr	Calculated hp	NO_X		CO		NMHC		PM		CO_2	O_2
				lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	%	%
1	MG13	6.90	121.81	Na	na	0.03	0.85	0.01	0.16	0.01	0.31	6.31	12.03
2	MG13	7.26	128.09	0.14	3.53	0.04	0.91	0.01	0.18	0.02	0.56 (a)	6.67	12.10
3	MG13	7.05	124.47	0.15	3.76	0.05	1.16	0.01	0.18	0.01	0.38	6.92	11.69
Avg.	MG13	7.07	124.79	0.14	3.64	0.04	0.97	0.01	0.18	0.01	0.35	6.63	11.94

(a) Run 2 not included in PM average.

TABLE 5-6. A/M32–86 EMISSION FACTOR SUMMARY

TRAVIS AFB - 100% LOAD

		Fuel usage,	Calculated	NO_X		CO		NMHC		PM		CO_2	O_2
Run No.	Unit No.	gal/hr	hp	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	%	%
1	DG87	7.27	133.64	0.18	4.39	0.03	0.75	4.20E-03	0.10	0.01	0.19	6.87	11.55
2	DG87	8.03	147.61	0.17	4.21	0.03	0.81	3.30E-03	0.08	0.02	0.42 (a)	7.02	11.31
3	DG87	8.12	149.23	0.17	4.24	0.03	0.82	3.04E-03	0.08	7.61E-03	0.19	7.10	11.22
Avg.	DG87	7.81	143.49	0.17	4.28	0.03	0.79	3.51E-03	0.09	7.71E-03	0.19	7.00	11.36
1	DG76	7.81	143.49	0.16	3.93	0.04	0.88	0.01	0.15	na	na	6.35	12.23

(a) Run 2 not included in PM average.

ELMENDORF AFB - 100% LOAD

		Fuel usage,	Calculated	NO_X		CO		NMHC		PM		CO_2	O_2
Run No.	Unit No.	gal/hr	hp	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	%	%
1	MG13	6.92	127.31	na	na	0.08	1.85	0.01	0.14	0.02	0.41	6.90	11.46
2	MG13	6.97	128.13	0.19	4.60	0.08	1.95	5.04E-03	0.12	0.01	0.37 (a)	7.06	11.19
3	MG13	6.91	126.95	0.17	4.08	0.07	1.64	0.01	0.14	0.01	0.37	6.87	11.32
Avg.	MG13	6.93	127.46	0.18	4.34	0.07	1.82	0.01	0.13	1.57E-02	0.39	6.94	11.32

(a) Run 2 not included in PM average.

TABLE 5-7.

Percentages of Non-Carbon Particles in Various Diameter Ranges by Number of Particles

	T-5-100-2	E-50-5-2	E-75-5-2	E-100-5-2
Diameter Range (um)				
.5-2.5	94.2%	97.7%	97.2%	100%
2.5-5.0	5.4%	1.8%	2.8%	0.0%
5.0-7.5	0.4%	0.3%	0.0%	0.0%
7.5-10	0.0%	0.0%	0.0%	0.0%
>10	0.0%	0.3%	0.0%	0.0%

*All other runs had insufficient particles for a valid statistical analysis.

Percentages of Non-Carbon Particles in Various Diameter Ranges by Estimated Mass of Particles

	T-5-100-2	E-50-5-2	E-75-5-2	E-100-5-2
Diameter Range (um)				
.5-2.5	36.1%	14.7%	46.6%	100%
2.5-5.0	43.6%	12.2%	53.4%	0.0%
5.0-7.5	20.4%	9.3%	0.0%	0.0%
7.5-10	0.0%	0.0%	0.0%	0.0%
>10	0.0%	63.9%	0.0%	0.0%

*All other runs had insufficient particles for a valid statistical analysis.

TABLE 5-8. A/M32–86 EMISSION SUMMARY

WEIGHTED RESULTS – BASED ON CCT PROVIDED HORSPEPOWER TRAVIS AFB

Unit No.	NO_X		CO		NMHC		PM		NO_X + NMHC
	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	g/hp-hr (a)
DG87	0.13	4.67	0.03	1.20	0.01	0.34	0.01	0.44	5.01
DG76	0.14	5.12	0.05	1.83	0.01	0.57	NA	NA	5.69
EPA Tier 1		6.9							
EPA Tier 2				3.7				0.22	4.9

(a) EPA will use an NMHC +NOx standard of 4.9 g/hp-hr for Tier 2 nonroad diesel engines

WEIGHTED RESULTS -ELMENDORF AFB

Unit No	NO_X		CO		NMHC		PM		NO_X + NMHC
	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	lbs/gal	g/hp-hr	g/hp-hr (a)
Mg13	0.13	4.72	0.04	1.45	0.01	0.56	0.01	0.47	5.28
EPA Tier 1		6.9							
EPA Tier 2				3.7				0.22	4.9

(a) EPA will use an NMHC +NOx standard of 4.9 g/hp-hr for Tier 2 nonroad diesel engines

WEIGHTING CRITERIA

Percent Load	Weighting Factor
100	0.05
75	0.25
50	0.30
25	0.30
10	0.10

Note: Weighting criteria specified in ISO 8178-4 "D2".

TABLE 5-9. A/M32–86 GENERATOR TESTING HAZARDOUS AIR POLLUTANTS (HAPs) EMISSION FACTOR SUMMARY lbs/1000 lbs fuel

	Unit DG87 (Travis AFB)	Unit MG13 (Elmendorf AFB)
Exhaust Flow, dscfm	342	353
Average Fuel Flow, lbs/hr	4.41	4.90
Pollutant		
Formaldehyde	8.01E-03	3.16E-02
Acetaldehyde	5.67E-03	1.12E-02
Acrolein	1.11E-02	2.45E-02
2-Butanone (MEK)	5.96E-03	2.30E-02
Benzene	9.70E-02	1.22E-01
Bromomethane	1.11E-03	2.48E-02
Chloromethane	1.64E-03	4.25E-02
Toluene	5.96E-02	1.13E-01
Ethylbenzene	1.21E-02	5.31E-02
Methylene chloride	3.70E-03	9.20E-02
m,p-Xylene	4.04E-02	1.11E-01
Naphthalene	**ND**	6.10E-02
o-Xylene	1.62E-02	7.25E-02
Styrene	7.87E-04	**ND**
Total HAPs	**0.27**	**0.79**

ND = Non-Detect

TABLE 5-10. A/M32–86 GENERATOR TESTING EMISSION FACTOR SUMMARY VOLATILE ORGANIC COMPOUNDS (VOCs)

		Unit DG87 (Travis AFB)				Unit MG13 (Elmendorf AFB)					
Flow Rate, dscfm (A)		342				353					
Fuel Flow, lbs/hr (A)		4.41				5.30				Average	
		lb/hr		lbs/1,000 lbs fuel		lb/hr		lbs/1,000 lbs fuel			
Analyte	CAS number	Detected	Detection limit	Detected	Detection limit	Detected	Detection limit	Detected	Detection limit	lb/hr	lbs/1,000 lbs fuel
Chloromethane[H]	74-87-3	7.23E-06		1.646E-03		2.25E-04		4.25E-02		1.16E-04	2.21E-02
Bromomethane[H]	74-83-9	4.88E-06		1.11E-03		1.31E-04		2.48E-02		6.81E-05	1.29E-02
Chloroethane[H]	75-00-3		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
Freon 11 (Trichlorofluoromethane)	75-69-4		9.39E-07		2.13E-04		9.39E-07		1.77E-04	9.39E-07	1.95E-04
1,1-Dichloroethane[H]	75-34-3		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
Carbon Disulfide[H]	75-15-0		9.39E-07		2.13E-04		9.39E-07		1.77E-04	9.39E-07	1.95E-04
Acetone	67-64-1	5.02E-05		1.14E-02		1.41E-04		2.65E-02		9.55E-05	1.90E-02
Methylene Chloride[H]	75-09-2	1.63E-05		3.70E-03		4.88E-04		9.20E-02		2.52E-04	4.79E-02
trans-1,2-Dichloroethene	156-60-5		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
1,1-Dichloroethene[H]	75-35-4		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
Vinyl Acetate[H]	108-05-4		4.69E-06		1.06E-03		4.69E-06		8.85E-04	4.69E-06	9.74E-04
cis-1,2-Dichloroethene[H]	156-59-2		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
2-Butanone (Methyl Ethyl Ketone)[H]	78-93-3	2.63E-05		5.96E-03		1.22E-04		2.30E-02		7.41E-05	1.45E-02
Chloroform[H]	67-66-3		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
1,1,1-Trichloroethane[H]	71-55-6		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
Carbon Tetrachloride[H]	56-23-5		9.39E-07		2.13E-04		9.39E-07		1.77E-04	9.39E-07	1.95E-04
Benzene[H]	71-43-2	4.28E-04		9.70E-02		6.48E-04		1.22E-01		5.38E-04	1.10E-01
1,2-Dichloroethane[H]	107-06-2		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
Bromodichloromethane	75-27-4		9.39E-07		2.13E-04		9.39E-07		1.77E-04	9.39E-07	1.95E-04
cis-1,3-Dichloropropene[H]	10061-01-5		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
trans-1,3-Dichloropropene[H]	10061-02-6		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
4-Methyl-2-pentanone (MIBK)[H]	108-10-1		4.69E-06		1.06E-03		4.69E-06		8.85E-04	4.69E-06	9.74E-04
Toluene[H]	108-88-3	2.63E-04		5.96E-02		6.01E-04		1.13E-01		4.32E-04	8.64E-02
1,1,2-Trichloroethane[H]	79-00-5		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
Tetrachloroethene[H]	127-18-4		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
2-Hexanone	591-78-6		4.69E-06		1.06E-03		4.69E-06		8.85E-04	4.69E-06	9.74E-04

TABLE 5-10 (continued)

		Unit DG87 (Travis AFB)				Unit MG13 (Elmendorf AFB)					
Flow Rate, dscfm (A)		342				353					
Fuel Flow, lbs/hr (A)		4.41				5.30				Average	
		lb/hr		lbs/1,000 lbs fuel		lb/hr		lbs/1,000 lbs fuel			
Analyte	CAS number	Detected	Detection limit	Detected	Detection limit	Detected	Detection limit	Detected	Detection limit	lb/hr	lbs/1,000 lbs fuel
Dibromochloromethane	124-48-1		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
Chlorobenzene[H]	108-90-7		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
Ethyl Benzene[H]	100-41-4	5.35E-05		1.21E-02		2.82E-04		5.31E-02		1.68E-04	3.26E-02
m,p-Xylene[H]	108-38-3	1.78E-04		4.04E-02		5.91E-04		1.11E-01		3.85E-04	7.60E-02
o-Xylene[H]	95-47-6	7.13E-05		1.62E-02		3.85E-04		7.25E-02		2.28E-04	4.44E-02
Styrene[H]	100-42-5	3.47E-06		7.87E-04			9.39E-07		1.77E-04	2.21E-06	4.82E-04
Bromoform[H]	75-25-2		9.39E-07		2.13E-04		9.39E-07		1.77E-04	9.39E-07	1.95E-04
1,1,2,2-Tetrachloroethane[H]	79-34-5		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
1,3-Butadiene[H]	106-99-0		4.69E-06		1.06E-03		4.69E-06		8.85E-04	4.69E-06	9.74E-04
1,2-Dichloropropane	78-87-5		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04
Trichloroethene	79-01-6		1.31E-06		2.98E-04		1.31E-06		2.48E-04	1.31E-06	2.73E-04

[H] Hazardous air pollutant (HAP)

(A) The exhaust flow rate and fuel flow represent a weighted average based upon the amount of sample time spent at each setting.

TABLE 5-11. A/M32–86 GENERATOR TESTING EMISSION FACTOR SUMMARY POLYNUCLEAR AROMATIC HYDROCARBONS

		Unit DG87 (Travis AFB)				Unit MG13 (Elmendorf AFB)				Average	
Flow Rate, dscfm (A)		342				353				348	
Fuel Flow, lbs/hr (A)		4.41				5.30				4.86	
		lb/hr		lbs/1000lbs fuel		lb/hr		lbs/1000lbs fuel			
Analyte	CAS Number	Detected	Detection Limit	Detected	Detection Limit	Detected	Detection Limit	Detected	Detection Limit	lb/hr	lbs/1000lb fuel
Naphthalene[H]	91-20-3		1.53E-04		3.47E-02	3.24E-04		6.10E-02		2.38E-04	4.79E-02
2-Methylnapthlene	91-57-6		1.53E-04		3.47E-02	3.24E-04		6.10E-02		2.38E-04	4.79E-02
2-Chloronapthalene	91-58-7		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Acenaphthene[H]	83-32-9		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Acenaphthylene[H]	208-96-8		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Fluorene[H]	86-73-7		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Phenanthrene[H]	85-01-8		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Anthracene[H]	120-12-7		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Fluoranthene[H]	206-44-0		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Pyrene[H]	129-00-0		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Chrysene[H]	218-01-9		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Benzo(a)anthracene[H]	56-55-3		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Benzo(b)fluoranthene[H]	205-99-2		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Benzo(k)fluoranthene[H]	207-08-9		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Benzo(a)pyrene[H]	50-32-8		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Indeno(1,2,3-c,d)pyrene[H]	193-3-5		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Dibenzo(a,h)anthracene[H]	53-70-3		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02
Benzo(g,h,I)perylene[H]	191-24-2		1.53E-04		3.47E-02		2.70E-05		5.09E-03	9.01E-05	1.99E-02

H - Hazardous Air Pollutant (HAP)

Note: Unless shown as detected, result was less than the reporting limit.

(A) The exhaust flow rate and fuel flow represent a weighted average based upon the amount of sample time spent at each setting.

**TABLE 5-12. A/M32–86 GENERATOR TESTING
EMISSION FACTOR SUMMARY
ADELHYDE/KETONES**

	Unit DG87 (Travis AFB)		Unit MG13 (Elmendorf AFB)		Average	
Flow Rate Dscfm (A)	342		353		348	
Fuel Flow lbs/hr (A)	4.41		4.90		4.66	
Analyte	**lbs/hr**	**lbs/ 1000 lbs fuel**	**lbs/hr**	**lbs/ 1000 lbs fuel**	**lbs/hr**	**lbs/ 1000 lbs fuel**
Formaldehyde[H]	3.53E-05	8.01E-03	1.55E-04	3.16E-02	9.50E-05	1.98E-02
Acetaldehyde[H]	2.50E-05	5.67E-03	5.49E-05	1.12E-02	4.00E-05	8.44E-03
Acrolein[H]	4.90E-05	1.11E-02	1.20E-04	2.45E-02	8.44E-05	1.78E-02
Propanal (Propionaldehyde)[H]	1.18E-05	2.67E-03	2.60E-05	5.30E-03	1.89E-05	3.98E-03
Crotonaldehyde	3.33E-05	7.56E-03	7.49E-05	1.53E-02	5.41E-05	1.14E-02
Isobutraldehyde / Methyl Ethyl Ketone[H]	9.81E-06	2.22E-03	3.29E-05	6.73E-03	2.14E-05	4.48E-03
Benzaldehyde	5.39E-05	1.22E-02	1.25E-04	2.55E-02	8.94E-05	1.89E-02
Isopentanal (Isovaleraldehyde)	4.71E-06	1.07E-03	ND	ND	5.60E-06	1.20E-03
Pentanal (Valeraldehyde)	2.11E-05	4.78E-03	4.04E-05	8.26E-03	3.08E-05	6.52E-03
o-Tolualdehyde	4.61E-06	1.05E-03	3.34E-05	6.83E-03	1.90E-05	3.94E-03
Hexanal (Hexaldehyde)	9.32E-06	2.11E-03	3.34E-05	6.83E-03	2.14E-05	4.47E-03
m, p-Tolualdehyde	3.24E-05	7.34E-03	1.45E-04	2.96E-02	8.86E-05	1.84E-02

[H]-Hazardous Air Pollutant (HAP)

Note: ND = No Detection

(A) The exhaust flow rate and fuel flow represent a weighted average based upon the amount of sample time spent at each setting.

TABLE 5-13. FUEL ANALYSIS

Parameter	Analytical Method	Diesel (Travis)	JP-8 (Travis)	JP-8 (Elmendorf)
Btu/lb	ASTM D-240	19744	19704	19702
Sulfur %	ASTM D-5453	0.010	<0.005	0.097
Carbon %	ASTM D-5291	86.25	85.97	86.04
Nitrogen %	ASTM 4629	103	6	7
Hydrogen %	ASTM D-5291	13.56	13.86	13.73
Ash %	ASTM D482	0.001	0.001	0.001
Naphthenes %[1]	PONA Analysis	83.6	84.9	55.8
Aromatics %	PONA Analysis	16.2	14.9	17.6
Parafins %[1]	PONA Analysis	0.0	0.0	26.3
Olefins %	PONA Analysis	0.2	0.2	0.3

[1]The saturate fraction of the Travis fuel samples was too dense to permit separation of the naphthene fration by the refractivity intercept method. The saturates appeared in all naphthenes.

SECTION 6

QUALITY ASSURANCE PROCEDURES

6.1 Quality Control Procedures

As part of the engine testing program, EQ implemented a quality assurance (QA) and quality control (QC) program. QA/QC are defined as follows:

- Quality Control - The overall system of activities whose purpose is to provide a quality product or service (e.g., the routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process).
- Quality Assurance - A system of activities whose purpose is to provide assurance that the overall QC is being conducted effectively.

Field Personnel for stack sampling were responsible for implementation of field QA/QC procedures. Individual laboratory managers were responsible for implementation of analytical QA/QC procedures. The overall Project Manager oversaw all QA/QC procedures to ensure that sampling and analyses met the QA/QC requirements and that accurate data results from the test program were obtained.

6.1.1 Field QC Sample Collection/Preparation Procedures

General field QC procedures were the following:

- Only the number of samples needed to represent the media being sampled were collected.
- To the extent possible, the quantities and types of samples and sample locations were determined prior to the actual field work.
- As few people as possible handled samples.
- Field personnel were responsible for the care and control of the samples collected until they were properly transferred or dispatched.
- Sample records were completed for each sample, using black waterproof ink or other measures to ensure the legibility and integrity of sample identification.

- Proper preservation, storage, and security procedures were followed during the field work, and additional samples were taken if needed.

- Storage conditions of samples were documented on the sample forms or project records.

6.1.1.1 QC Procedures for Stack Gas Sample Collection

This subsection provides a list of QC procedures that were employed during the field sampling effort. Method-specific QC procedures are detailed in the method descriptions contained in Appendix A. General QC checks that apply to all methods include the following:

- Use of leak checks.
- Use of standardized forms, labels, and checklists.
- Ensurance of sample traceability.
- Collection of appropriate blanks.
- Use of calibrated instrumentation.
- Use of Protocol 1 and/or NIST-traceable calibration gases.
- Review of data sheets in the field to verify completeness.
- Use of validated spreadsheets for calculating results.

6.1.1.2 Velocity/Volumetric Flow Rate QC Procedures

Volumetric flow rates were determined during the isokinetic stack gas tests. The following QC procedures were followed during these tests:

- The Standard pitot tube was inspected visually prior to sampling.

- The pitot tube was leak-checked before sampling.

- Proper orientation of the pitot tube was maintained while measurements were made.

- The manometer oil was leveled and zeroed before each run.

- Pitot tube coefficients were determined based on physical measurement techniques as delineated in EPA Method 2A.

6.1.1.3 Moisture Content and Sample Volume QC Procedures

Gas stream moisture was determined by EPA Method 4 as part of the isokinetic stack gas tests. The following QC procedures were followed in determining the volume of moisture collected:

- The balance zero was checked and rezeroed if necessary before each weighing.

- The balance will be leveled and placed in a clean, motionless environment for weighings.

- The indicating silica gel will be fresh for each run and will be inspected periodically and replaced during runs, if needed.

The QC procedures that will be followed to ensure accurate sample gas volume determination are the following:

- The dry gas meter will be fully calibrated annually by using an EPA-approved intermediate standard device.

- Pretest, port-change, and posttest leakchecks will be completed (must be less than 0.02 cfm or 4 % of the average sample rate).

- The gas meter will be read to the thousandth of a cubic foot for all initial and final readings.

- Readings of the dry gas meter, meter orifice pressure **(Delta H)**, and meter temperatures will be taken at every sampling point.

- Accurate barometric pressures will be recorded at least once per day.

- Pre- and posttest program dry gas meter checks will be completed to verify the accuracy of the meter calibration constant (Y).

All calibrations were conducted according to standard operating procedures (SOP) by using materials traceable to NIST reference materials. Calibrations will be conducted by qualified personnel thoroughly familiar with the sampling equipment. All calibration and audit results were recorded in a field logbook and/or the calibration/audit data sheets. Other specific QA/QC for particulate, VOST, aldehydes and ketones, and CEMS are in Appendix F, and in Tables 6-1 and 6-2.

6.1.2 Exhaust Gas Blank Samples

Stack gas blank samples consisted primarily of reagent blanks collected in the on-site sample recovery area during the test program. Reagent blanks included solvents used to recover stack samples, absorbing solutions, filters, and resins (Tenax, Tenax/charcoal). All reagent blanks were collected by transferring directly from storage containers to sample jars, or labeling filters and resins as blank samples.

A blank Method 0011 (aldehydes and ketones) sample train was taken to the stack sample location, leak checked, and then recovered in the same manner as the Method 0011 stack samples.

TABLE 6-1. FIELD CHECKS OF SAMPLING EQUIPMENT

Equipment	Checked Against	Allowable Difference
Pitot tube	Inspection	No visible damage
Thermocouples	ASTM 2F or 3F	1.5%
Probe nozzles	Caliper	High-low 0.004 in.

TABLE 6-2. FIELD CHECKS OF TGO, CO AND NO_X ANALYZERS

	Instrument Check	Acceptable Limit
Initial Calibration	O_2, CO_2, CO & NO_x Calibration Error, % Span	±2%
	TNMHC Calibration Error, % Gas Value	±5%
	Sampling System Bias	< 5% of Span
Daily Calibration	O_2, CO_2, CO & NO_x Calibration Error, % Span	±2%
	TNMHC Calibration Error, % Gas Value	±5%
	O_2, CO_2, CO & NO_x Drift, % Span	< 3% of Span
	TGO Drift, % Span	< 3% of Span

The sampling media may contain small amounts of the target compounds emitted from naturally occurring or anthropogenic emission sources. Contamination may be introduced to the sampling media during handling of the media in the laboratory, in the field, or during shipping.

Blank samples were used to quantify these sources of contamination. A blank sample consisted of a complete set of sampling media (e.g., a polyurethane foam cartridge and a glass fiber filter) that had no air drawn through it by the sampling equipment. Field blank samples were collected during the monitoring program.

The field blanks were used to identify contamination resulting from field sample handling procedures. A field blank was handled in the same manner as an actual sample, undergoing the same preparation, installation in the sampler module, and recovery procedures.

The following stack sample blank corrections were performed.

- Particulate — Acetone and methylene chloride blank.
- VOST — Field and trip blanks.
- Aldehydes and Ketones — Reagent blanks.

6.2 Sampling Containers, Preservative, and Volume Requirements

Table 6-3 lists the holding times, storage containers, and preservation requirements used for routine storage and handling of samples.

6.3 Decontamination Procedures

Stack-gas sampling equipment was pre-cleaned following standard source test method procedures. All stack-gas sampling equipment was cleaned on site as part of individual sample recovery procedures. Sample containers were purchased from a vendor with a certificate indicating that each lot of bottles was free of contaminants. All personnel associated with sample collection used designated personal protective equipment (PPE). Personnel followed standard PPE decontamination procedures for each level of PPE required. All personnel received the proper hazardous materials training as specified in 29 CFR 1910.

TABLE 6-3. RECOMMENDED SAMPLE CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES

Sample Location	Analyte	Matrix	Container Type and Size	Preservation	Holding Time
Stack Gas	Particulate	Liquids, filters, and resins	AG/500 mL	NA	NA
	Condensable particulate		AG/1.0 L	NA	NA
			G/40 mL	$\leq$4 °C	14 days
	Volatile organics		AG/1L	$\leq$4 °C	14 days to exit/40 days to analysis
	Aldehydes and Ketones	Liquid	AG/1.0 L	$\leq$4 °C	14 days

Key:

A= Aluminum Foil
AG = Amberglass
D = Denuder Tube
E = Envelope/Folder
G = Glass
NA = Not Applicable
P = Plastic
S = Stainless Steel Canister.

6.4 Sampling Packaging and Shipment

All samples were packaged and shipped according to the specifications detailed in the Hazardous Materials Transportation Regulations published by the U.S. Department of Transportation (DOT) (49 CFR 171-180) for ground transportation and the International Air Transport Association (IATA) regulations for air shipment. These regulations contain detailed instructions on how hazardous materials must be identified, packaged, marked, labeled, documented, and placarded. All personnel involved with sample shipment were trained and certified for shipment of hazardous materials.

When transferring possession of samples, the individuals relinquishing and receiving those samples signed, dated, and noted the time on the sample chain-of-custody record. This record documented sample transfer from the sampler, often through another person or commercial carrier, to the sample custodian or analyst.

The procedure for shipping samples was as follows:

- A complete sample inventory form (chain-of-custody) was enclosed with the samples being shipped, and a copy was retained by the Field Team Leader.
- DOT and IATA regulations were followed for shipping container requirements. The regulations required that the shipper make a reasonable determination whether the sample is classified as a hazardous material and, if so, that it is appropriately identified.
- Each package was designed and constructed, and its contents limited, so that under normal transportation conditions there was no significant release of materials to the environment and no potentially hazardous conditions.
- Samples were placed inside a shipping container for transport back to the laboratory.
- The samples (e.g., refrigerant packs, ice, chemical preservatives, etc.) were preserved as required by the test plan or analytical requirements and documented on the sample inventory record.

The Project Manager retained all freight bills and shipping records as part of the permanent records.

6.5 Custody Procedures

An overriding consideration for environmental measurement data is the ability to demonstrate that samples have been obtained from the locations stated by using the prescribed

methods and that they have reached the laboratory without alteration. Evidence of collection, shipment, laboratory receipt, and laboratory custody until disposal was documented to accomplish this objective. A chain-of-custody record documented each sample and the individuals responsible for sample collection, shipment, and receipt. A sample was considered "in custody " under the following conditions:

- The sample was in a person's actual possession.
- It was in view after being in physical possession.
- The sample was secured in a locked compartment so that no one could tamper with it after it had been in physical custody.
- It was in a secured area, restricted to authorized personnel.

6.5.1 Field Custody Procedures

EQ initiated sample custody during collection of the samples. Preformatted labels were used at the time of collection. Documents prepared specifically for monitoring field sample collection and recovery were used to record pertinent information about the types and numbers of samples collected and shipped for analysis. The samples collected first were assembled at an on-site location for batching and paperwork checks. This task included matching similar sample types (e.g., solids, liquids) from all sampling locations. Sample packaging procedures complied with all DOT and IATA requirements for shipment of environmental samples. Establishing or maintaining sample integrity involved numerous steps or considerations in addition to custody documentation. For example, major concerns in programs of this nature are contamination, cross-contamination, and/or degradation of sample containers; absorbing and filtration media; recovery materials; and actual samples, as applicable. These problems were avoided or minimized at all times by using the following procedure:

- The lid of each labeled jar was secured with a strip of custody tape.
- Individual sample jars were sealed in plastic bags and placed in appropriate shipping containers.
- Volatile materials were stored, handled, and transported apart from sorbent materials [e.g., stored, handled, and shipped VOST tubes were kept apart from solvents (methylene chloride, acetone, toluene, etc.) used to recover the other sample trains].

- Volatile, organic, and aldehyde and ketone samples were sealed and kept away from sources of solvents, gasoline, etc., during recovery, transportation, storage, and analysis (e.g., particulate samples in which acetone was used were recovered remotely from preparation, recovery, and storage of VOST and aldehyde and ketone samples).
- Vermiculite was placed around the bags in the shipping container for protection from damage, if needed. Ice was placed in the shipping container, if required.
- One chain-of-custody form was completed for each shipping container and placed in a large plastic bag, and the bag was then taped to the inside lid of the shipping container.
- The container was taped closed with tape and sealed with custody tape on two sides such that opening the container would break the custody tape.

Collected samples were kept under lock and key or within sight at all times until their shipment to the laboratory. Field Personnel acted as sample custodians in order to monitor the location of collected samples.

A unique system for individual sample identification was used.

6.6 Calibration Procedures and Frequency

This subsection describes the calibration procedures and the frequency at which these procedures were performed for both field and laboratory instruments.

6.6.1 Field Instrument Calibration

The following equipment items were calibrated before and after field usage:

- Velocity measurement devices
- Gas flow rate metering systems
- Gas volume metering equipment
- Gas composition measuring apparatus (Orsat).

The calibration records included device numbers, calibration dates, methods, and data and results, and were maintained on file at the EQ laboratory. Copies of applicable calibration records also were available at the job site for review.

Acceptance limits are shown for each equipment item in Table 6-4.

TABLE 6-4 FIELD EQUIPMENT CALIBRATION SUMMARY[a]

Equipment	Calibrated Against	Allowable Error
Method 5 meter box	Reference test meter	Y ±0.02 Y ΔH@ 0.20 ΔH@ post-test Y ±0.05 Y
Orsat	Certified cylinder gas	±0.5%
Pitot tube	Geometric specifications	See EPA Method 2
Thermocouple	ASTM-3F thermometer	±1.5%
Impinger (or condenser thermometer)	ASTM-3F	±2°F
Dry gas meter thermometer	ASTM-3F	±5°F
Probe nozzles	Caliper	High-low 0.004 in.
Barometer	NBS traceable barometer	±0.1 in. Hg

[a]As recommended in the *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III. Stationary Source-Specific Methods.* EPA-600/4-77-027b, August 1977.

6.7 Data Reduction, Validation, and Reporting

Data was produced primarily from the following three sources:

- Engine operations during the test program.
- Field measurements data, including sampling records (volumes and duration), and observations.
- Sample analysis and characterization data.

All data generated by field activities or by the laboratory were reduced and validated prior to reporting. Specific data reduction, validation, and reporting procedures are described in the following subsections.

6.7.1 Data Reduction

6.7.1.1 Field Data Reduction Procedures

The stages of data confirmation began with an initial series of calculations completed on the same day as the sampling effort to establish that the pretest assumptions were correct and that the test procedures completed to that point were performed in an acceptable manner. This enabled the on-site test team to correct any faulty procedures, and provided a greater understanding of any immediate problems. The on-site data reduction and confirmation activities were performed by an experienced data management specialist.

6.7.1.2 Office Calculations

An experienced technician "double-checked" all data averages to verify numerical accuracy. Prior to use of the analytical data to calculate test results, a check was applied to designate any obvious "out-of-line" results for reanalysis.

All results of calculations were examined by another individual. Depending on the complexity of the work, this person either spot-checked certain calculations or repeated the entire effort. When all data were summarized, a check was made to determine test result correctness.

The initial field test data and resulting calculations were performed on a portable PC at the end of each test day. In the office, final results and result tables were developed on a microcomputer. Standard EPA method programs have been developed and validated for the computational systems to ensure that correct equations are utilized to generate results. The programs listed all entry items (for proofing purposes) and produced calculated results in hard copy form. Reference method equations were used to calculate the concentration and/or mass rate of each measured parameter.

6.7.2 Analytical Data Validation Evaluation

All data was compared to the acceptance criteria of the reference method. For example, particulate tests must be 100% isokinetic, ±10%, to be acceptable. Laboratory data was acceptable only if calibration standards fall within the established control limits.

Outliers were treated on a case-by-case basis. All questionable data was reviewed in an attempt to find a reason for rejection. All questionable data is outlined in Section 5 of this scientific and technical report.

Unacceptable data was appropriately qualified in Section 5 of this scientific and technical report. Case narratives were prepared, which included information concerning data that fell outside acceptance limits and any other anomalous conditions encountered during sample analysis. After the Laboratory QA Officer approved these data, they were considered ready for data validation.

6.7.2.1 Procedures Used to Evaluate Field Data

Procedures used to evaluate field data included posttest field instrument calibration checks, acceptable isokinetic sampling rates, and demonstration of acceptable posttest leak checks.

6.7.3 Data Reporting

Data reporting procedures were performed for field operations as indicated in the following subsections.

6.7.3.1 Field Data Reporting

Field data reporting was conducted principally through the generation of test data tables containing tabulated results of all measurements made in the field, and documentation of all field calibration activities.

6.8 Preventive Maintenance Review

Well-maintained equipment is an essential ingredient in ensuring the quality, completeness, and timeliness of the field and analytical data. This subsection reviews the schedules of preventive maintenance that must be performed to minimize the downtime for critical measurement systems for each contracting company. Also, lists of critical spare parts that must be available at the individual field and laboratory sites must be developed and reviewed. This subsection represents a review of the preventive maintenance items that were required for the field operations.

6.8.1 Field Instrument Preventive Maintenance

Field source testing equipment and instrumentation that require maintenance and/or calibration were serviced immediately prior to conducting the test program.

Normal spare parts (e.g., control consoles, sample boxes, probes, glassware, sample bottles, etc.) as well as extra materials/supplies (e.g., filters, solutions, solvents, XAD traps, etc.) were available at the field site during testing.

Extra spare parts and equipment for process sample collection and compositing equipment, glassware, sample containers, etc., were available at the field site during testing. Extra materials/supplies (e.g., filters, solvents, etc.) required for the process sample collection were also available at the field site during testing.

Sufficient volumes of protocol and calibration gases for the CEM monitoring, extra fittings, sample lines, pumps, heating tapes, and analyzer cells, along with sufficient materials/supplies (e.g., pump oil, filters, etc.) were available at the field site during testing.

6.9 Corrective Action

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or procedures out of QC performance that can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation, and data assessment. All corrective actions proposed and implemented should be documented.

Corrective actions were initiated when data quality problems were determined during the program. These data quality problems were flagged "out of control" if they are outside the predetermined limits specified above for internal, performance, system, and data audits. When discovered, prompt action toward a solution was undertaken by the generator of the data. The corrective action was conducted through the following six activities:

- Define the quality problem.
- Notify the designated individuals listed in the work plan.
- Determine the cause of the problem.
- Determine the corrective action.
- Implement the corrective action.
- Verify the solution to the problem.

Corrective action was instituted immediately by the individual noting a problem in a measurement system.

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APPENDIX A

EMISSION SAMPLING METHODS

EPA METHOD 5 AND EPA METHOD 202

Particulate

The test train utilized to perform the particulate and condensable particulate sampling will conform to U.S. EPA Methods 5 and 202 (M5/M202).

The impingers will be charged as indicated below (Figure 1):

- Impingers 1 through 3: 100 ml deionized water.
- Impinger 4: 300 g of silica gel.

The particulate train will consist of the following compounds:

- A borosilicate or stainless-steel nozzle with an inside diameter sized to sample the amount of exhaust specified in Method 5.
- A heated, borosilicate-lined probe equipped with a calibrated thermocouple to measure flue gas temperature and an S-type pitot tube to measure the flue gas velocity pressure.
- A heated oven containing a borosilicate connector and filter holder with a Soxhlet-extracted glass-fiber filter.
- A rigid borosilicate connector to join the outlet of the filter holder to the inlet of the impinger train.
- Greenburg-Smith impingers plus a thermocouple to detect sample gas exit temperature.
- A vacuum line (umbilical cord) with adapter to connect the outlet of the impinger train to a control module.
- A control module containing a 3-cfm carbon-vane vacuum pump (sample gas mover), a calibrated dry gas meter (sample gas volume measurement device), a calibrated orifice (sample gas flow rate monitor), and inclined manometers (orifice and gas stream pressure indicators).

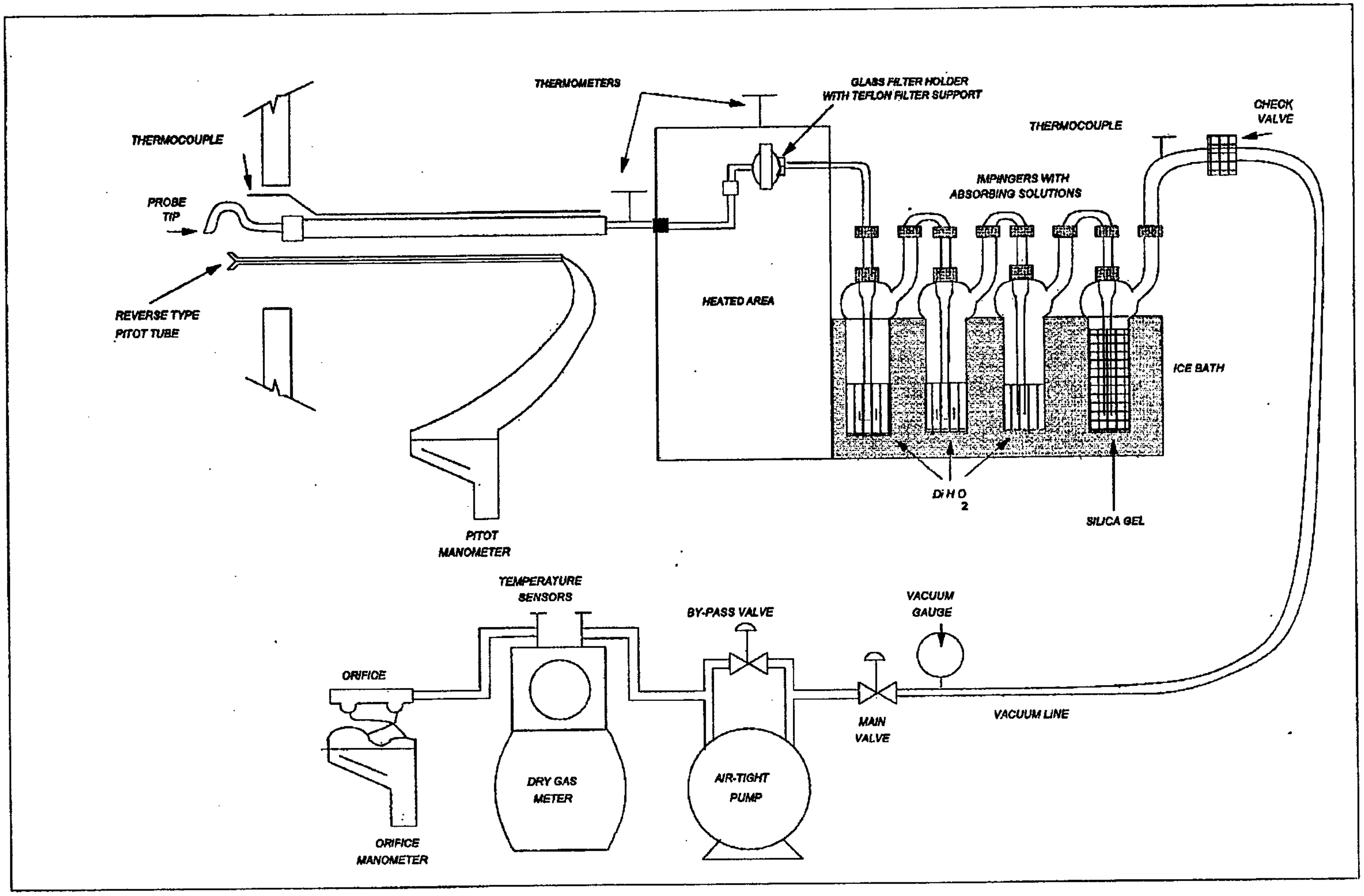

FIGURE 1
PARTICULATE (front and backhalf) SAMPLING TRAIN
EPA METHOD 5 AND METHOD 202

- A switchable, calibrated, digital pyrometer to monitor flue and sample gas temperatures.

The M5/M202 train will be calibrated to satisfy U.S. EPA requirements. Sample collection will follow U.S. EPA M5/M202 procedures. Prior to sampling, the number of traverse points and their locations will be calculated using U.S. EPA Method 1.

Figures 2, 3, and 4 illustrate the procedures that will be used to prepare the particulate sampling trains prior to each test, the procedures used to sample the stack flue gases, and the procedures used to recover the samples from the train, respectively. Each test will be 60 minutes in length, 50 ft^3 in sample volume, and isokinetic ± 10%.

Particulate Matter Analysis (M5/M202)

The M5 probe/front-half acetone wash and filter fractions and back-half condensate from all test runs will be analyzed gravimetrically for particulates according to U.S. EPA M5/M202. The front-half particulate analysis will be performed according to the procedures established in U.S. EPA Reference Method 5 (40 CFR 60, Appendix A). As specified by the method, quartz filters exhibiting >99.5 % efficiency on 0.3-micron dioctyl phthalate smoke particles will be used. Particulate analysis of the filter will be performed by oven-drying the filter. The filter will be oven-dried for 2 to 3 hours at 105°C (220°F) and cooled in a desiccator. The filter will be weighed to a constant weight.

Constant weight means a difference of no more than 0.5 mg or 1% of total weight less tare weight, whichever is greater, between two consecutive weighings.

The acetone probe rinse will be checked for any leakage during transport. The liquid will be measured volumetrically to the nearest ±1 ml. The contents will be transferred to a tared 250-ml beaker. The probe rinse will be evaporated to dryness at ambient temperature and pressure. The beaker will be weighed to a constant weight and the results reported to the nearest 0.1 mg.

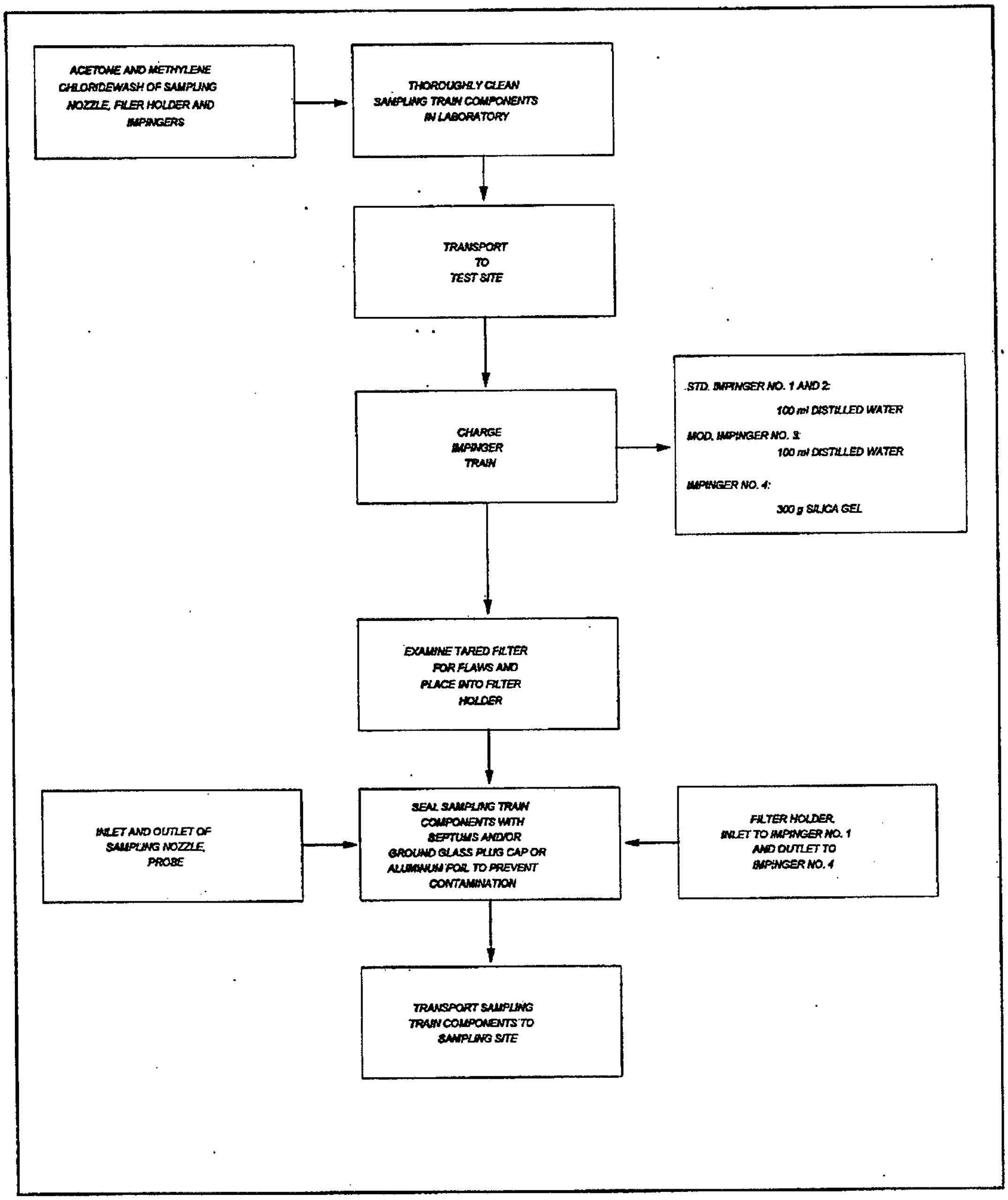

FIGURE 2
PREPARATION PROCEDURES FOR PARTICULATE (M5/M202) SAMPLING TRAIN

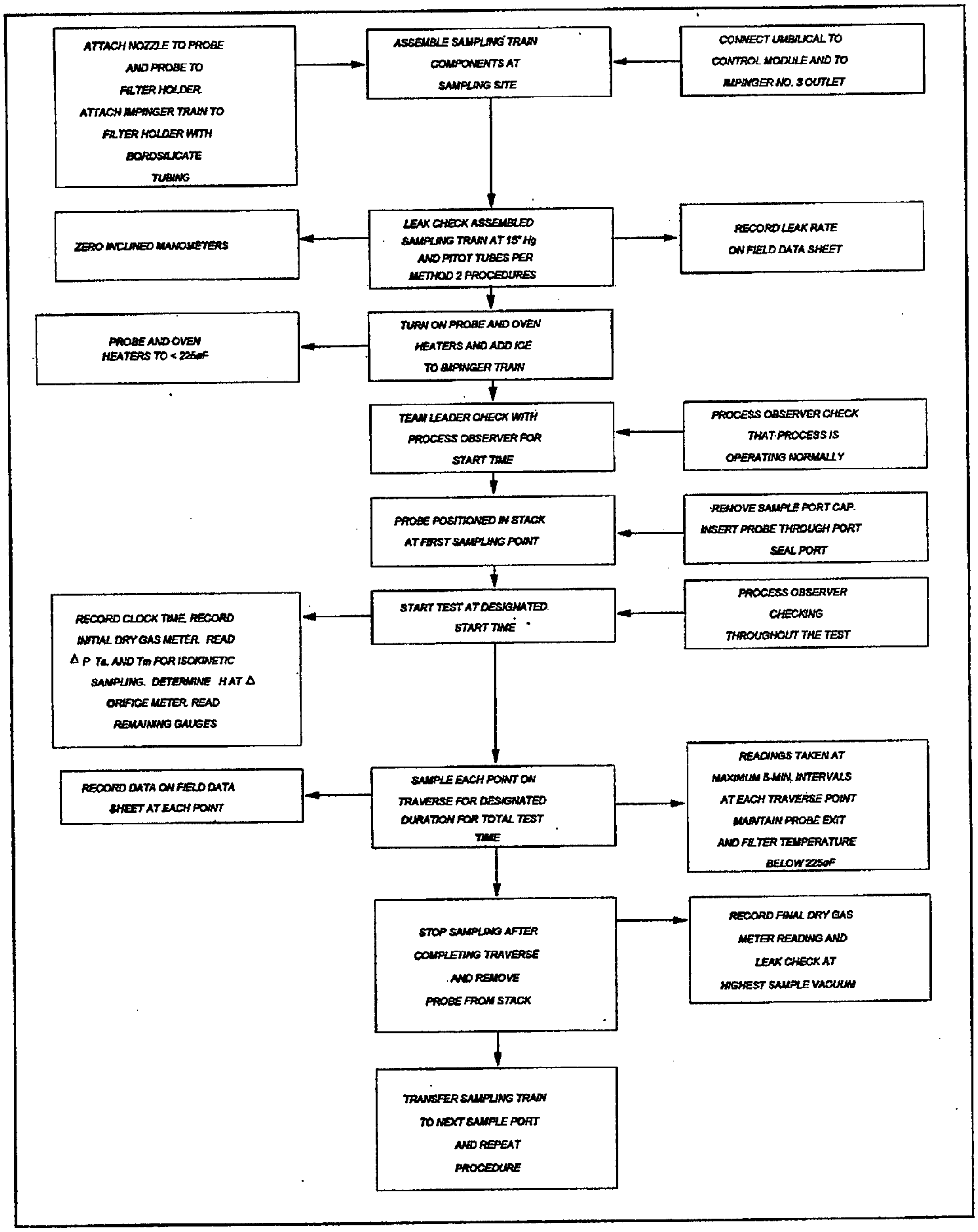

FIGURE 3
TEST PROCEDURES FOR PARTICULATES (M5/M202)

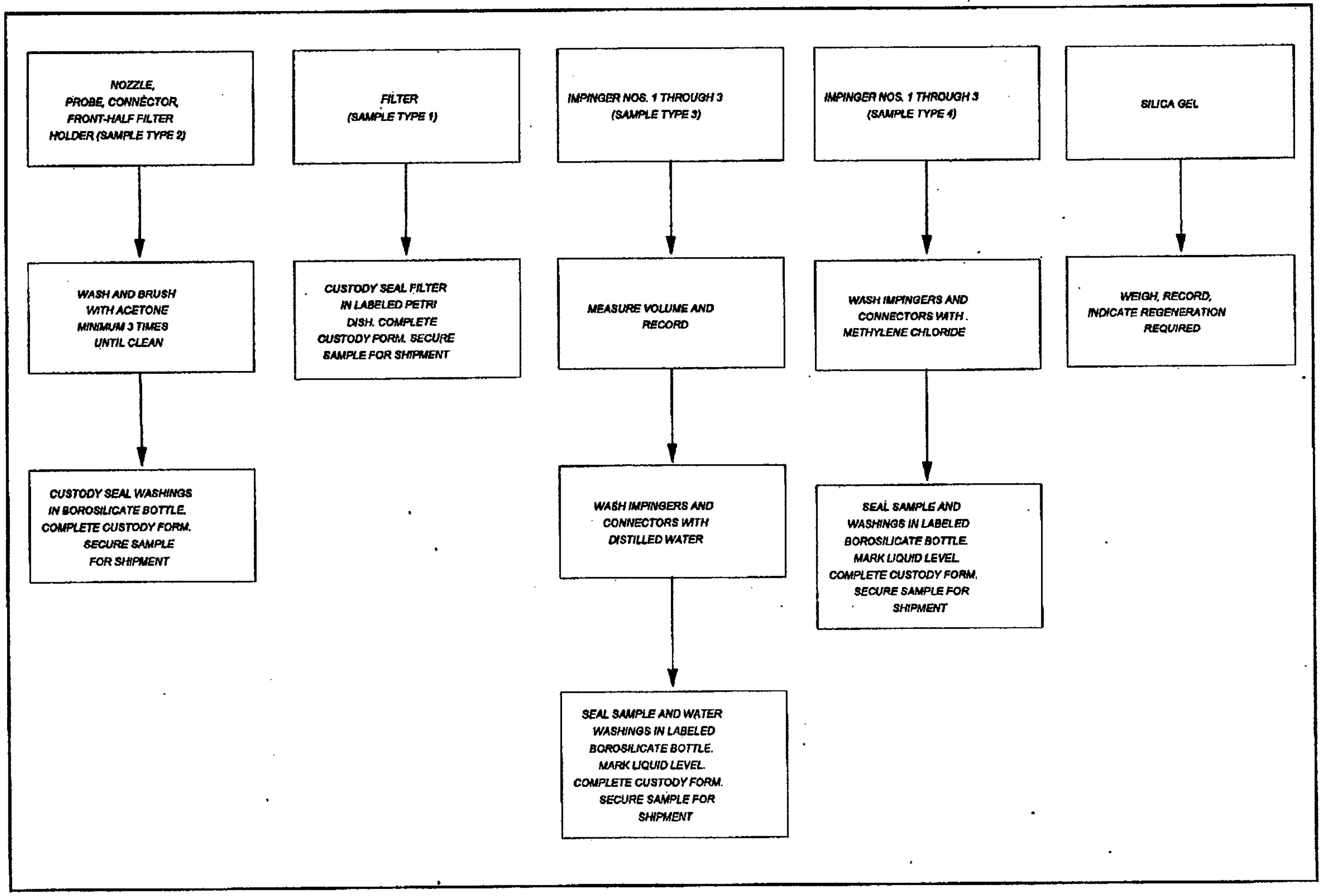

FIGURE 4
SAMPLE RECOVERY PROCEDURES FOR PARTICULATE (M5/M202) SAMPLING TRAIN

The back-half condensable particulate fraction analysis will be performed according to procedures established in U.S. EPA Reference Method 202 (40 CFR 60, Appendix A). The back-half water and wash samples will be combined in a separator funnel to separate aqueous and organic phases. The organic-phase extract will be placed in a tared beaker and evaporated to dryness at ambient temperature and pressure, then desiccated to a constant 0.1-mg weight. A methylene chloride extraction will be performed on the distilled water blank sampling to obtain a blank correction value.

The extracted water sample and extracted distilled water sample blank will be poured into tared beakers, evaporated to dryness at 220 to 230°F, then desiccated at ambient temperature and pressure to a constant 0.1-mg weight. The residue weight of the dried distilled water samples will be adjusted based on the water blank sample correction factor.

Particulate QC Sampling Procedures

The sampling QC procedures that will be used to ensure representative measurements of particulates are the following:

- The sample rate must be within 10 % of the true isokinetic (100 %) rate.
- All sampling nozzles will be manufactured and calibrated according to U.S. EPA standards.
- Particulate filters will be pre-test and post-test weighed (following 24 hours of desiccation) to the nearest 0.1 mg to a constant (± 0.5 mg) value.
- Recovery procedures will be completed in a clean environment.
- Sample containers for liquids will be constructed of borosilicate with Teflon®-lined lids. Filters will be stored in plastic or borosilicate petri dishes.

EPA METHOD 0011-FORMALDEHYDE SAMPLING TRAIN

The formaldehyde in the stack gas emission stream will be determined by U.S. EPA Method 0011. The sampling train (see Figure 1) will consist of the following components connected in a series:

- A calibrated borosilicate nozzle attached to a heated borosilicate probe.
- A rigid borosilicate connector to join the outlet of the sampling probe to the inlet of the impinger train.
- An impinger train consisting of four impingers. The first, second, and third impingers will each contain 100 ml of cleaned 2,4-dinitrophenylhydrazine (DNPH) solution. The fourth impinger will contain 300 grams of dry preweighed silica gel. The second impinger will be a Greenburg-Smith type; all other impingers will be of a modified design. All impingers will be maintained in a crushed ice bath.
- A vacuum line (umbilical cord with adapter) to connect the outlet of the fourth impinger train to a control module.
- A control module containing a 3-cfm carbon-vane vacuum pump (sample gas mover), a calibrated dry gas meter (sample gas volume measurement device), a calibrated orifice (sample gas flow rate monitor), and inclined manometers (orifice and gas stream pressure indicators).

Figures 2, 3, and 4 outline the preparation, sampling, and recovery procedures that will be used to determine the formaldehyde at the stack location.

Formaldehyde Analysis Procedures

The analytical procedures for the quantification of formaldehyde will be performed as specified in U.S. EPA Methods 0011 and 0011A utilizing high-performance liquid chromatography (HPLC).

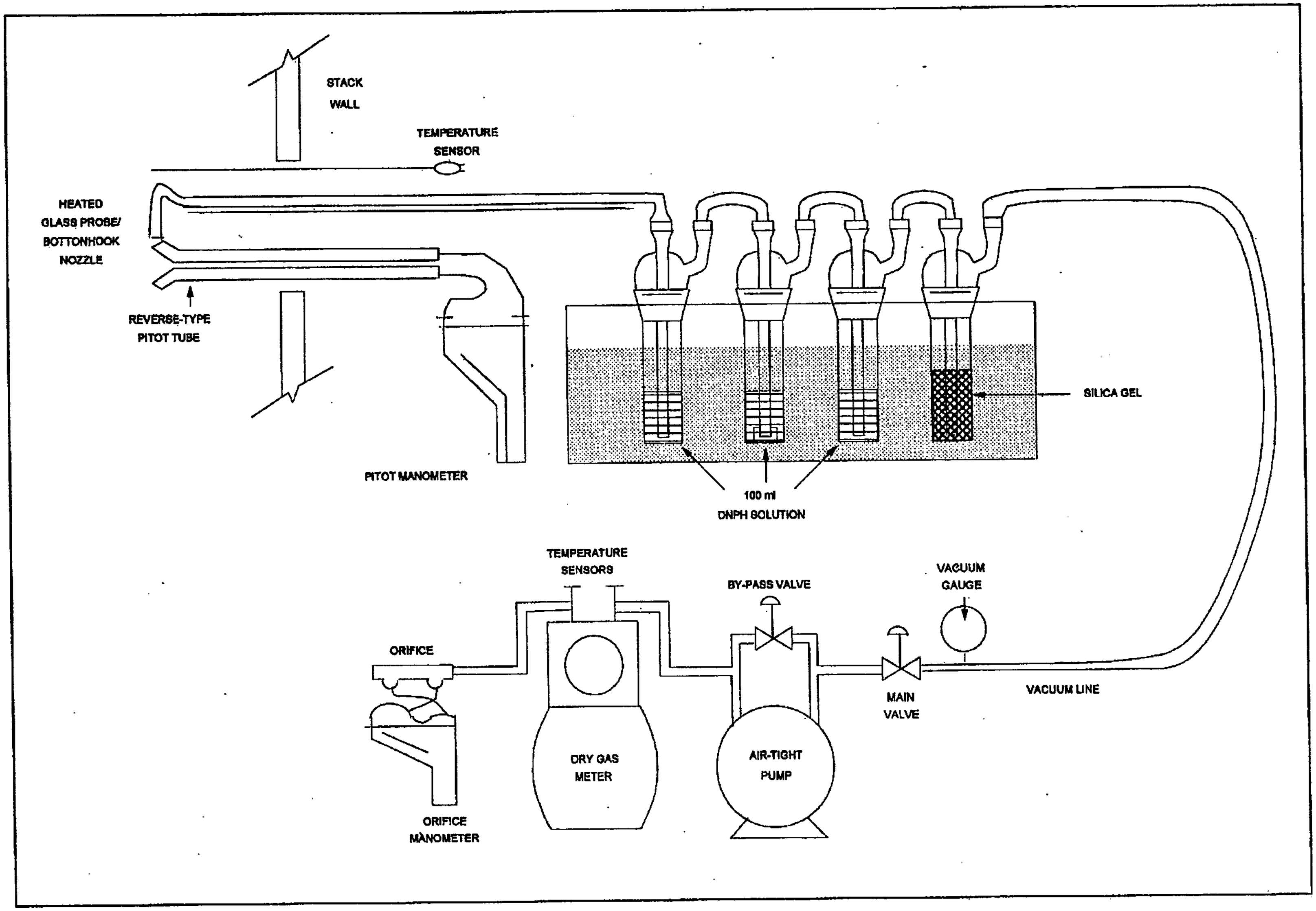

FIGURE 1. EPA METHOD 0011 - FORMALDEHYDE SAMPLING TRAIN

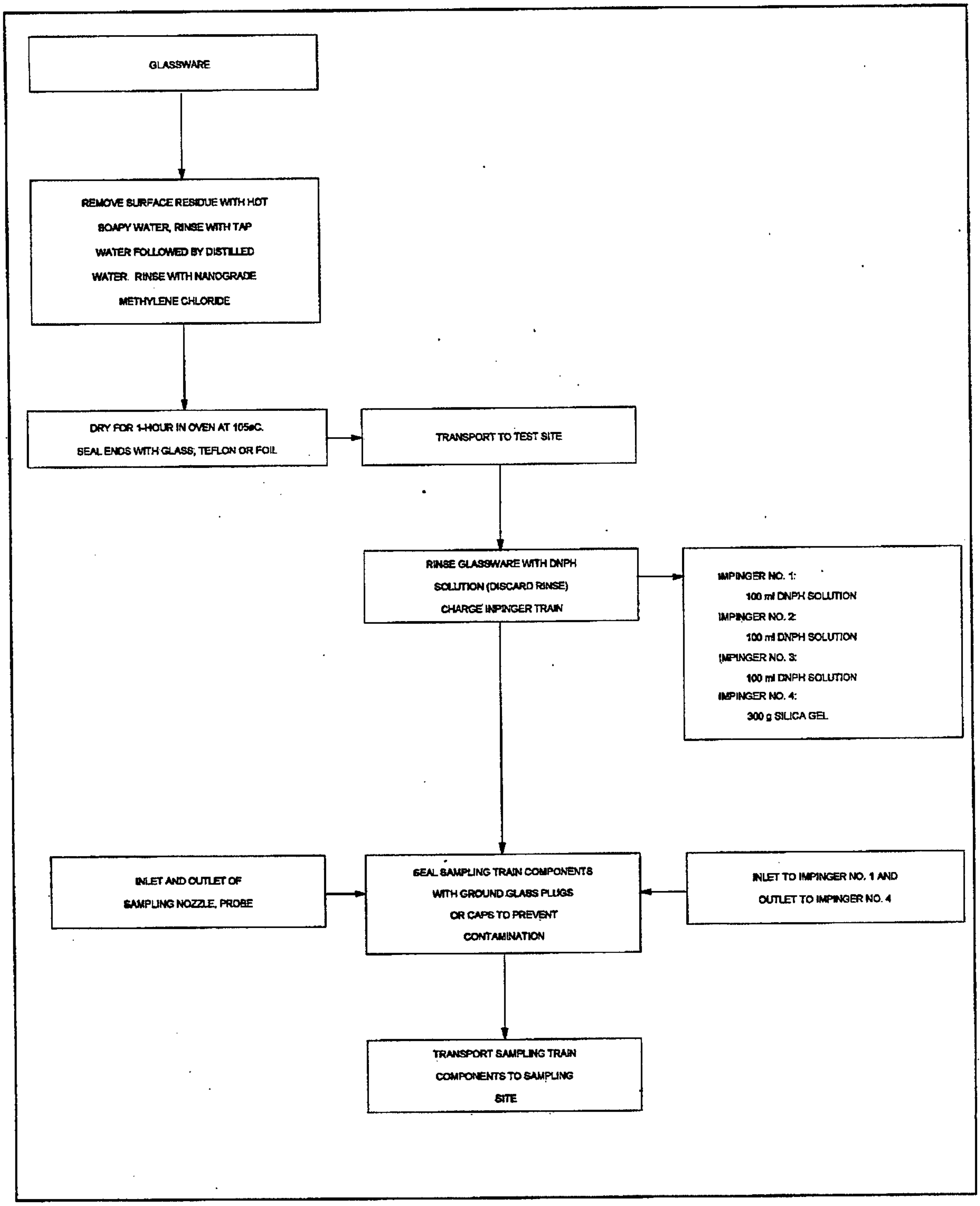

FIGURE 2
PREPARATION PROCEDURES FOR FORMALDEHYDE SAMPLING TRAIN

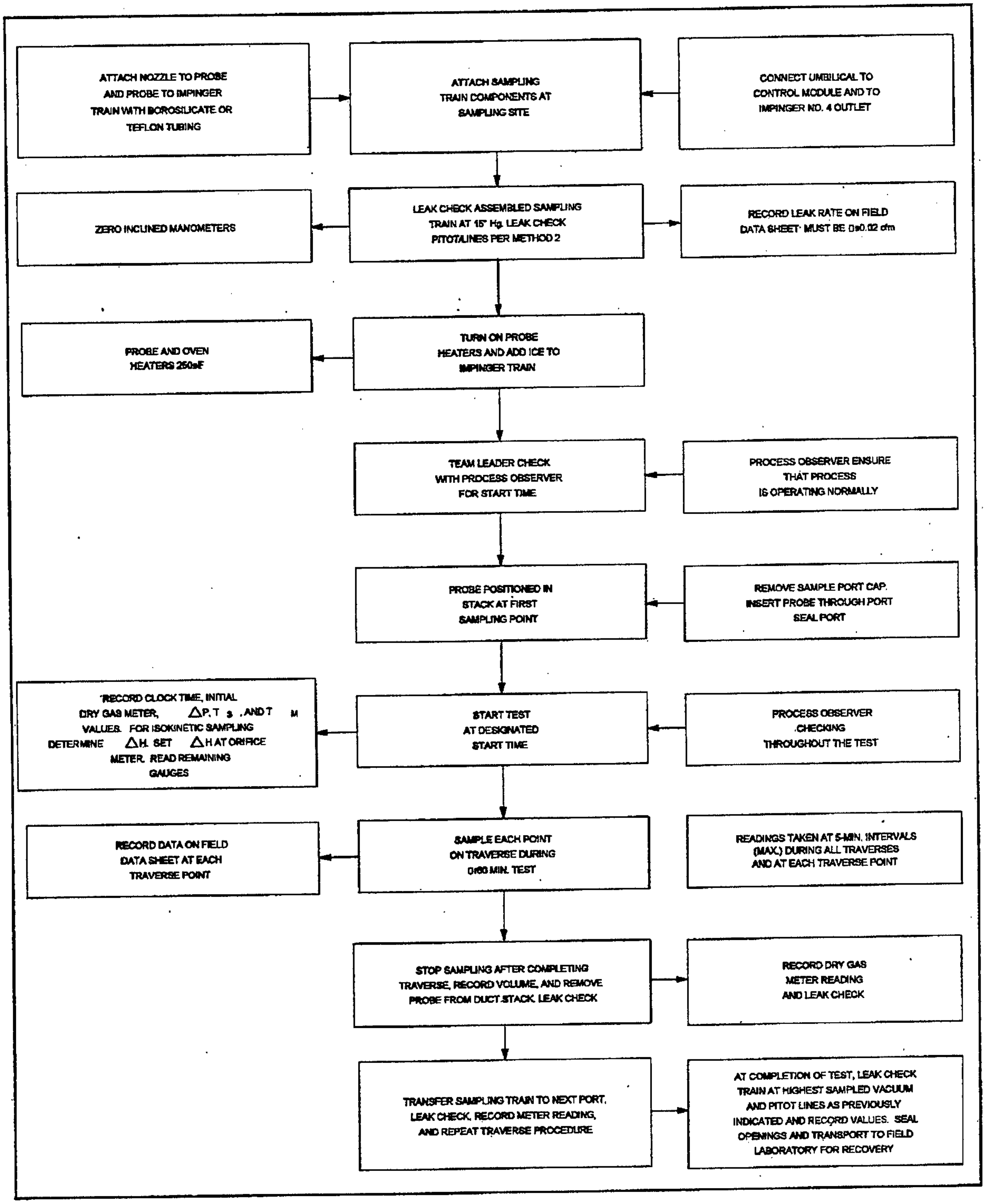

FIGURE 3
SAMPLING PROCEDURES FOR FORMALDEHYDE

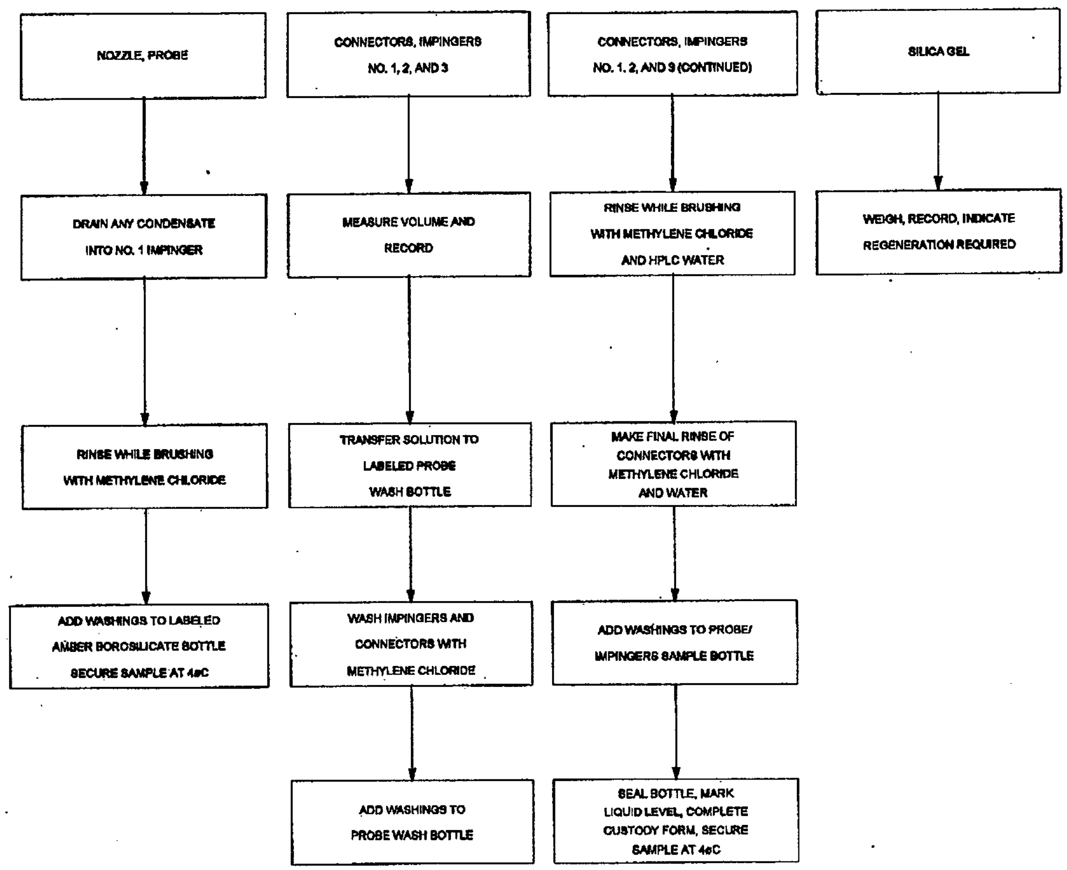

FIGURE 4
SAMPLE RECOVERY PROCEDURES FOR FORMALDEHYDE SAMPLING TRAIN

Each of the three DNPH impingers will be recovered, composited, and analyzed as one sample. The samples must be chilled immediately to stabilize the DNPH-carbonyl derivatives.

The HPLC will be calibrated prior to use each day. Calibration standard mixtures will be prepared from appropriate reference materials and will contain analytes appropriate for the method of analysis.

If a correlation of 0.996 cannot be obtained, additional standards must be analyzed to define the calibration curve. A midpoint calibration check standard will be analyzed each shift to confirm the validity of the initial calibration curve. The check standard must be within 20% of the initial response curve to demonstrate that the initial calibration curve is still valid.

Calibration data, including the correlation coefficient, will be retained in laboratory notebooks to maintain a permanent record of instrument performance.

At least one method blank and two method spikes will be included in each laboratory lot of samples. The method spikes and blanks will be in aqueous media. Method spikes will be examined to determine if contamination is being introduced in the laboratory.

The spikes will be examined to determine both precision and accuracy. Accuracy will be measured by the percent recovery of the spikes; precision will be measured by the reproducibility of both method spikes.

Formaldehyde QC Sampling Procedures

The following QC procedures will ensure representative formaldehyde data are taken:

- Reagents will be used that meet method criteria. A supply of the DNPH reagent will be extracted the day before shipping to the test site. Two aliquots from each lot of DNPH prepared will be reserved for blank analysis per U.S. EPA Method 0011.
- The formaldehyde trains will be assembled and recovered in an environment free from uncontrolled dust and contaminated organics, and will be performed in an area away from other test train recovery activities to minimize contamination. The train will be prerinsed with DNPH to eliminate any acetone residue prior to charging.
- DNPH will be stored in a cool environment and away from other solvents.

EPA METHOD 0030 (VOST)

Volatile Organic Compounds

The volatile organics in the stack gas emission stream will be determined by U.S. EPA Method 0030 (VOST). This sampling train (see Figure 1) will consist of the following components connected in series:

- A heated borosilicate or quartz probe containing a glass wool particulate filter.
- An ice-water-cooled condenser connected to the probe, followed by a temperature sensor, an adsorption cartridge containing 1.6 grams of Tenax, and a condensate trap.
- A section of Teflon tubing used to connect the outlet of the condensate trap to a second condenser, which will be followed by a backup sorbent trap containing 1 gram of Tenax and 1 gram of activated charcoal, a second condensate collector, and a borosilicate tube containing an unweighed amount of dry silica gel.
- A tube of silica gel connected via an umbilical cable to a control console containing flow controllers, a calibrated 1-liter-per-minute dry gas meter, a sample pump, a temperature indicator, and other components.

A total of one VOST tube pair will be collected during each test period. The volatile organics will be determined by analyzing the tube pair by purge-trap-desorb GC/MS.

Figures 2, 3 and 4 outline the preparation, sampling, and recovery procedures that will be used to determine the volatile organics at the stack location.

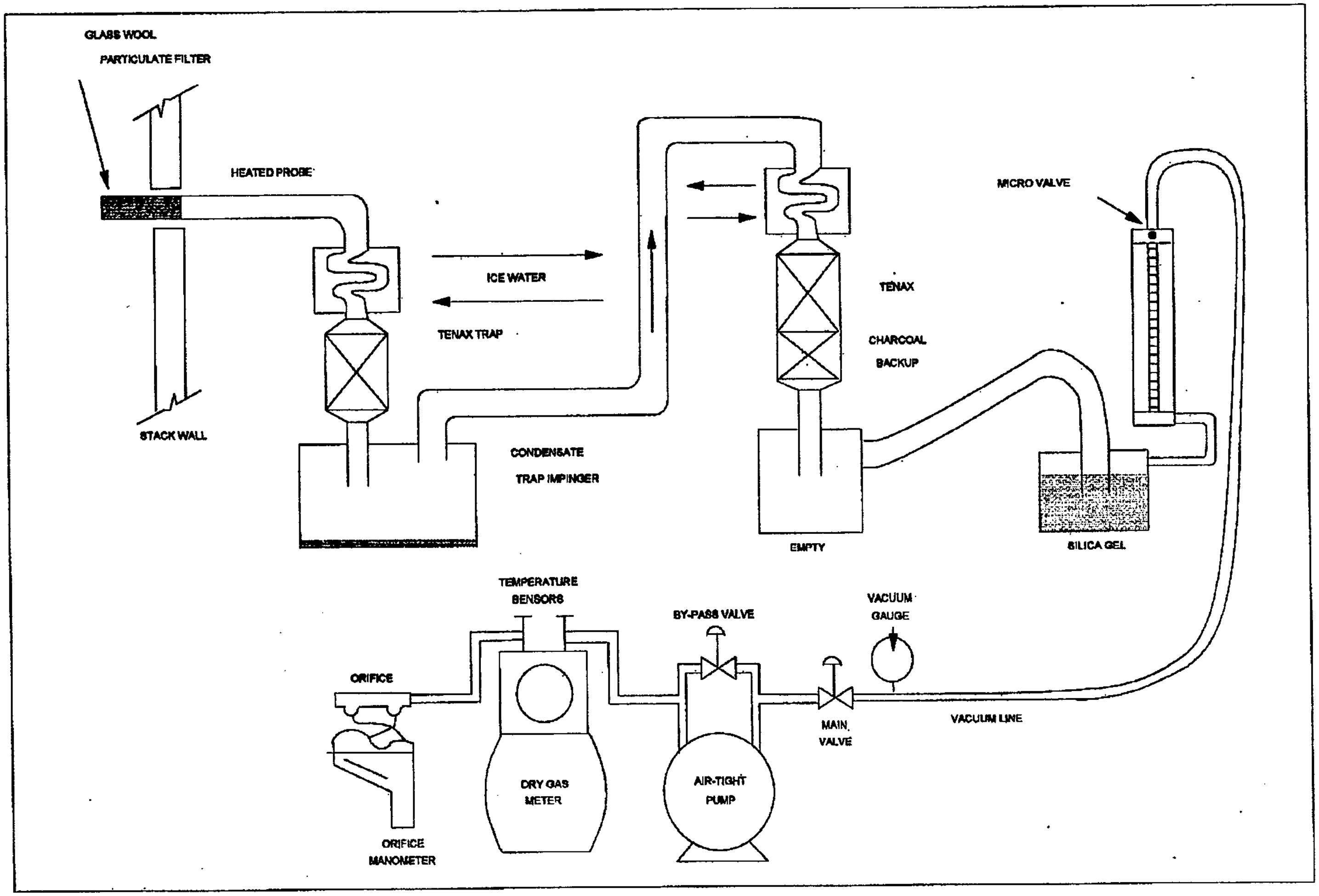

FIGURE 1
EPA METHOD 0030 - VOLATILE ORGANIC SAMPLING TRAIN (VOST)

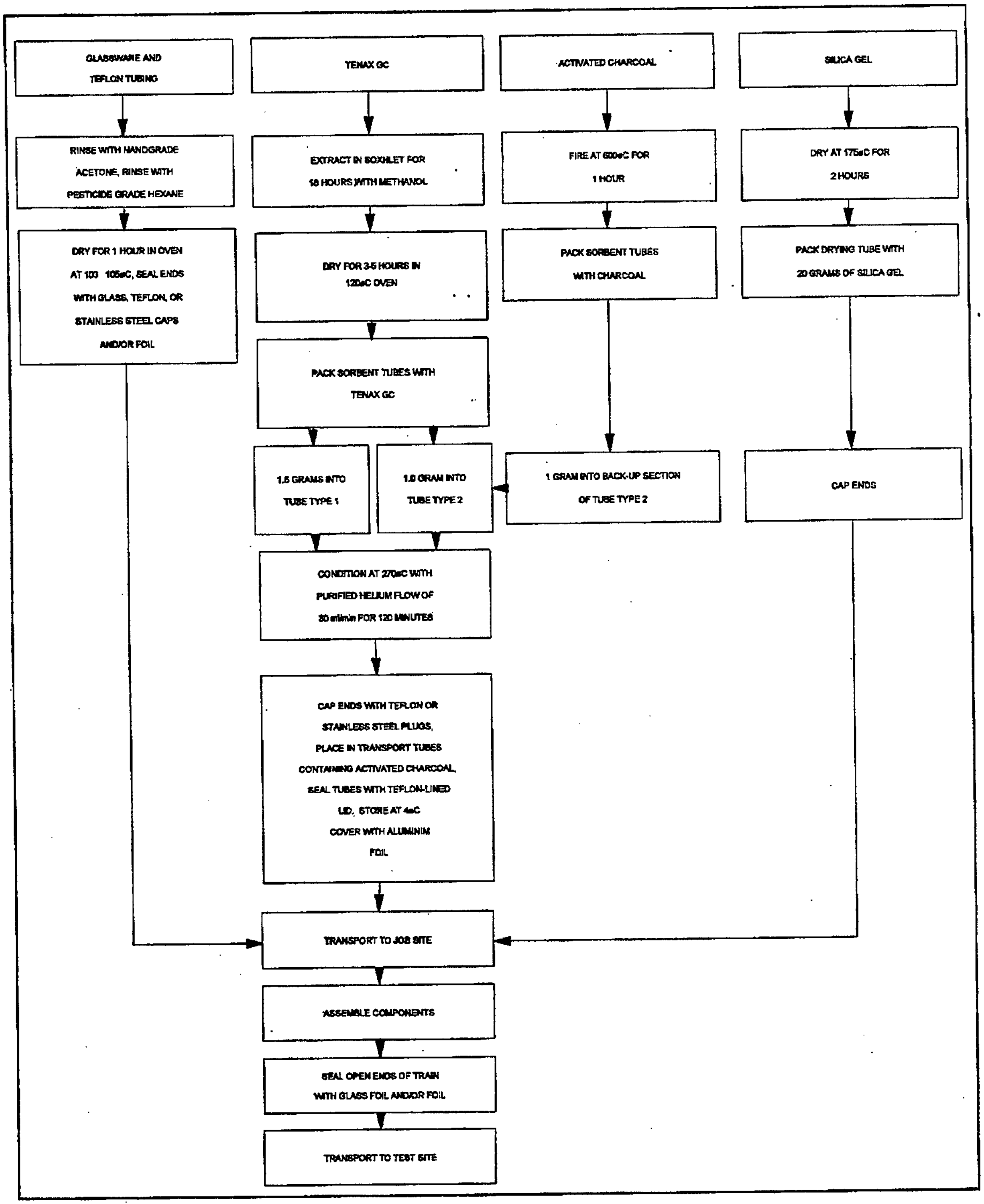

FIGURE 2
PREPARATION PROCEDURES FOR VOLATILE ORGANICS SAMPLING TRAIN

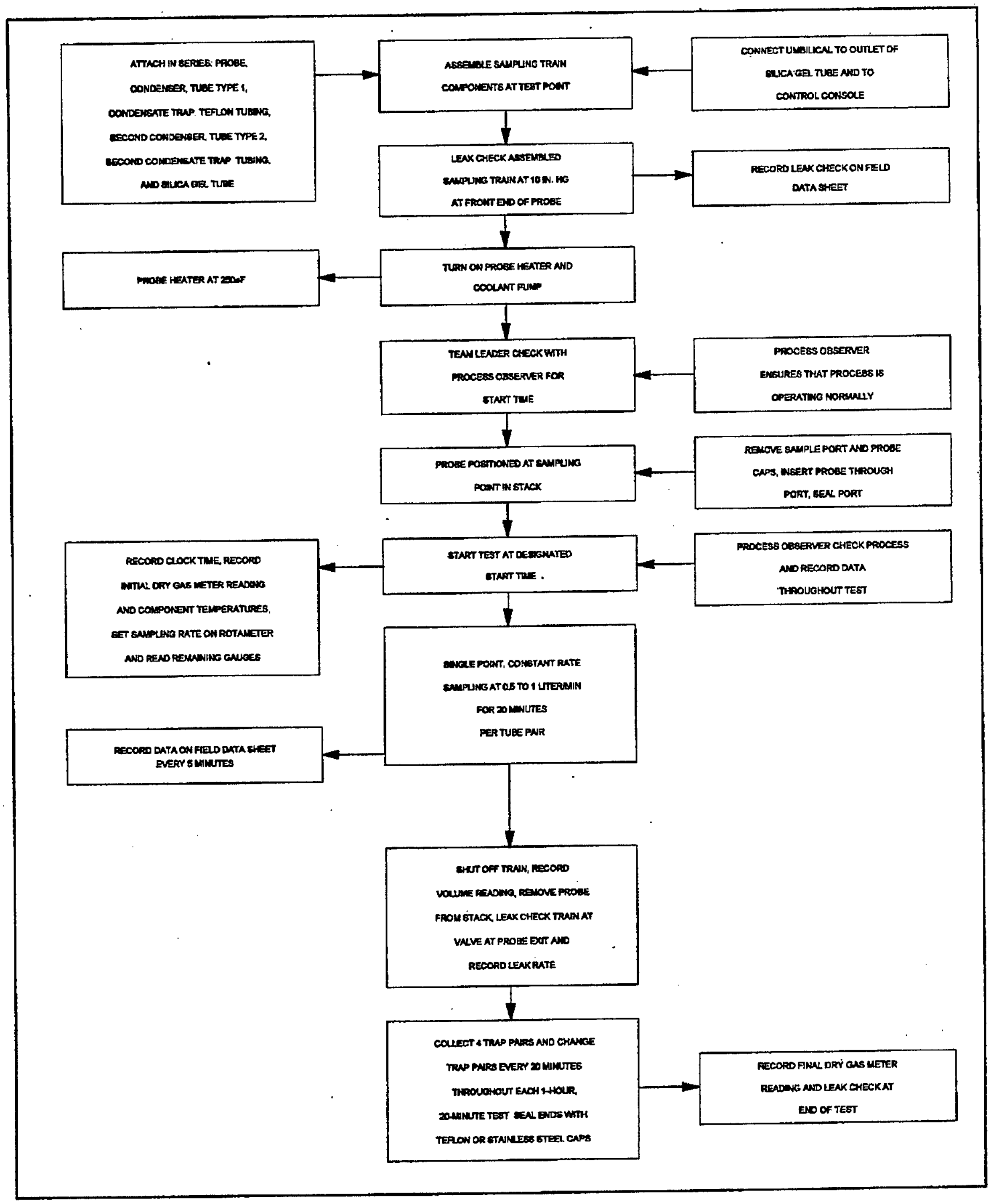

FIGURE 3
SAMPLING PROCEDURES FOR VOLATILE ORGANICS

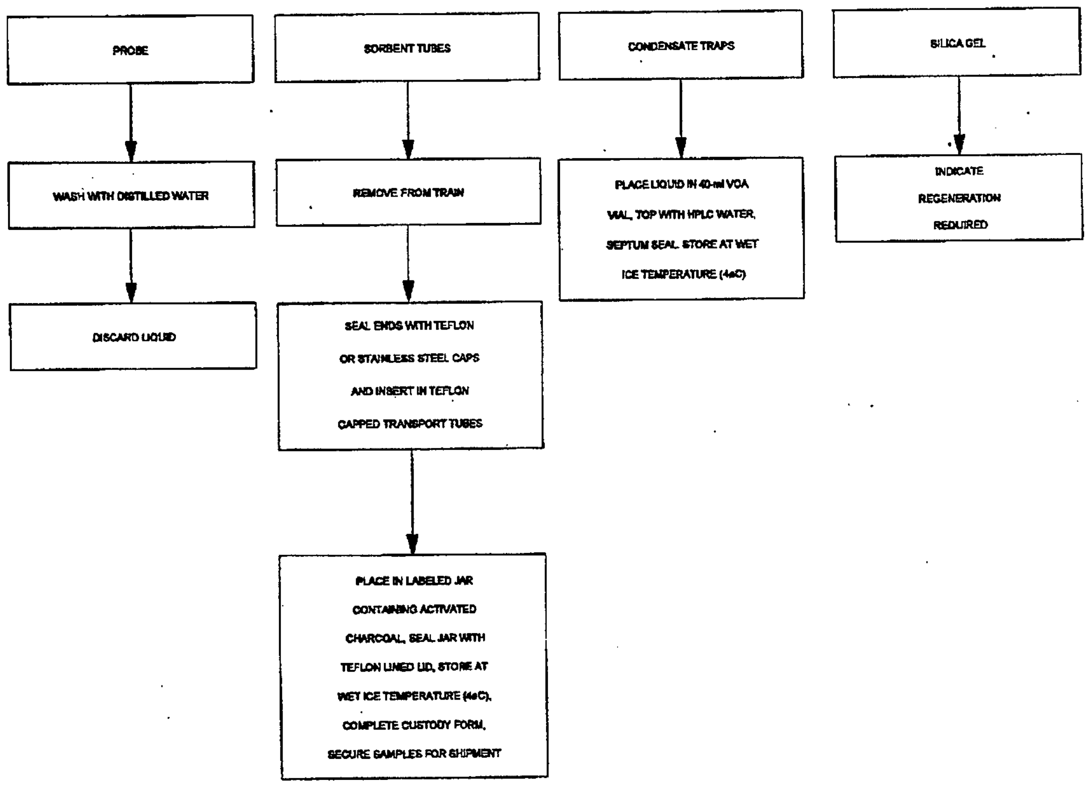

FIGURE 4
RECOVERY PROCEDURES FOR VOLATILE ORGANICS

Volatile Organics Analysis

The VOST samples will be placed in cold storage (<4°C) upon receipt in the laboratory. The samples have a recommended 14-day holding time from collection to analysis. The samples will require no additional preparation for analysis, except addition of the internal standard and the surrogate (D_8-toluene).

Volatile organics present in stack gases will be collected on Tenax and Tenax/charcoal sorbent cartridges using a VOST. Method 5040 (SW-846, third edition) describes in detail the procedural steps required to desorb VOST cartridges and analyze the effluent gas stream for VOCs. Additionally, if peaks of other compounds appear in the total ionization chromatogram (up to 10), they will be tentatively identified using a forward library search against the U.S. EPA/National Institutes of Health (NIH) mass spectral library and semiquantified relative to an internal standard spiked into the traps prior to analysis.

Methanolic solutions of internal standard compounds will be spiked onto each set of tubes prior to thermal desorption and analysis.

After spiking, the contents of the sorbent cartridges will be desorbed thermally for approximately 10 minutes at 180°C with organic-free nitrogen or helium gas, and bubbled through a tower to impinge water desorbed from the cartridges. Target analytes will be trapped on an analytical adsorbent trap. After the 10-minute desorption, the analytical adsorbent trap will be heated rapidly to 180°C with the carrier gas flow reversed. VOCs will be desorbed from the analytical trap and vented directly to a megabore column in the GC. The VOCs will be separated by temperature-programmed GC and detected by low-resolution MS. Concentrations of VOCs will be calculated using the internal standard technique.

VOST QC

The QC procedures that will ensure representative volatile organics data are the following:

- All sample and recovery glassware will be precleaned as per the procedure outlined in U.S. EPA Method 0030.
- The distilled water used for recovery of the condensate sample will be HPLC grade.

- Blanks of distilled water and unused tube pairs will be retained for blank analysis.
- All condensate and tube pair samples will be maintained at 4°C following collection and prior to analysis.
- VOST train preparation and recovery will be conducted in an area away from other test train recovery activities to avoid solvent contamination.

CONTINUOUS EMISSION MONITORING METHODS

The continuous emission monitoring system (CEMS) will be utilized to monitor gaseous emissions from stationary sources. The CEMS will monitor one or more of the following analytes: oxygen (O_2), carbon dioxide (CO_2), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen oxides (NO_x), and total hydrocarbons (THCs). These measurements will satisfy the requirements of the following U.S. EPA Reference Methods:

- Method 3A — Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources.
- Method 6C — Determination of Sulfur Dioxide Emissions from Stationary Sources.
- Method 7E — Determination of Nitrogen Oxide Emissions from Stationary Sources.
- Method 10 — Determination of Carbon Monoxide Emissions from Stationary Sources.
- Method 25A — Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer.

The CEMS consists of the sampling interface, the analyzers, and the data collection system. The sample interface will begin at the sample probe and extract the sample from the source, transport the samples to the analyzers, and filter the samples. For most of the analytes the moisture in the sample will be removed in the sample interface prior to analysis. Only the flame ionization analyzer sample will be analyzed on a wet basis. The sample interface will allow calibration gas to be introduced at the analyzer and at the sample probe. The analyzers will provide the next component of the CEMS. The analyzers must meet specific calibration requirements. The data collection system will record the raw voltage signal output from the analyzers, convert the signal to represent the analyte concentration, and store these concentrations as discrete averages (usually 1-minute averages). At the end of any test run, the data collection system will correct the test results for calibration drift and bias as required in the EPA methods.

The CEMS can be operated to monitor one or all of the analytes. The sampling interface will be modified to suit the source characteristics and the desired analytes.

Sample Interface

The hot, wet sample interface (see Figure 1) must be used if THCs are being measured. The sample will be extracted through a heated probe, filter, and sample line to prevent condensation. The sample interface components that are outside the stack will be maintained at or above 250 °F. The hot, wet sample interface will consist of the following components:

- An unheated inner stainless-steel probe extension, which will be maintained at stack temperature.
- A heated probe section (at least 250 °F) which penetrates the stack wall and connects the inner probe to the heated filter box.
- A heated filter box (at least 250 °F) which contains calibration gas injection ports and an in-line stainless-steel filter.
- A heated sample line (at least 250 °F) to transport the sample from the filter box to the analyzer manifold.
- A heated manifold, which will split the sample between the heated and unheated analyzers.
- A VIA MAK II low-contact refrigerated condenser to remove water.
- A flow distribution manifold to maintain the required sample flow to each analyzer.

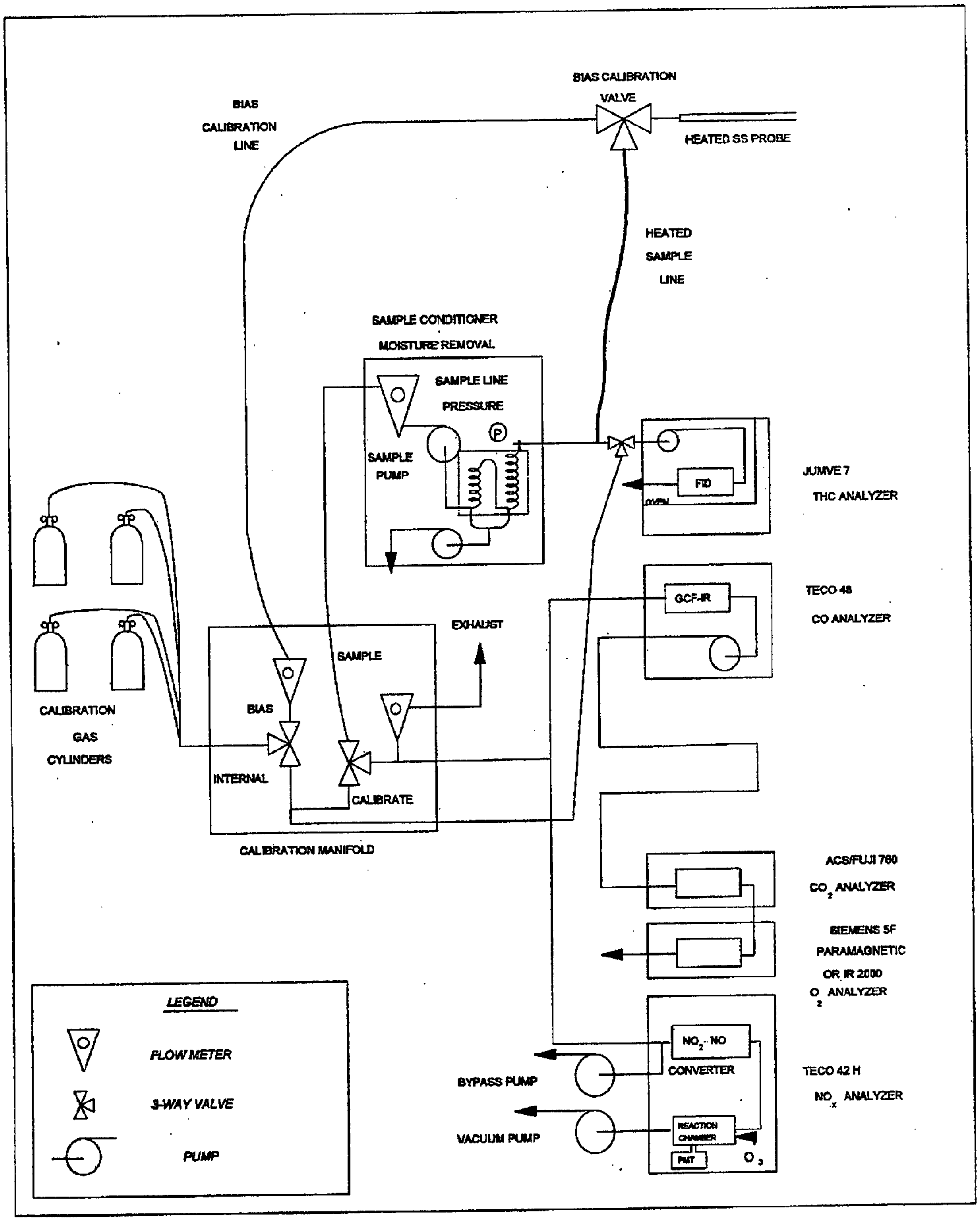

Figure 1
Continuous Emissions Monitoring System

One fraction of the sample will be transported by a short heated line to the hydrocarbon analyzer. The remaining sample will be sent to a VIA MAK II low-contact refrigerated condenser to remove water. The condenser will be maintained at 38 °F, and condensed moisture will be removed continuously from the bottom of the condenser through a peristaltic pump. The dried sample will pass through a pump and control valve, and will be distributed to the various analyzers by a distribution manifold. The critical flow parameter for each analyzer will be monitored with a rotameter as described below. The sample control valve will be adjusted to ensure that the sample gas always will be provided in excess, and that the excess sample will be released to the atmosphere.

Calibration

Calibration of the CEMS is always conducted in two steps: internal (direct to the instrument) and bias (direct to the probe end in the heated filter box). The internal calibration always is conducted first to verify instrument response. The internal calibration is conducted by introducing a calibration standard through the flow distribution manifold.

The instrument response will be adjusted initially by observing the front display of the analyzer. All final calibration response data must be collected from the datalogger display. Typically, there will be a slight difference between the analyzer front panel display and the data logger display, and the calibration data must be consistent with the recorded test data.

The bias calibration will be conducted prior to the start of the test run. This calibration will be conducted by introducing the calibration gas standard to a tee on the end of the probe in the heated filter box. The calibration gas will be supplied in excess and the surplus gas will flow out of the open end of the probe into the stack. This will ensure that bias calibrations are conducted at stack pressure.

The calibration drift will be measured at the end of the test run by repeating the bias calibration for zero and one or more calibration standards. The difference between the pretest and posttest CEMS response will be the calibration drift.

Analyzers

The following analyzers may be used in the CEMS:

- Total hydrocarbons:

  JUM Model VE- 7
  Flame ionization analyzer
  Range: 0 to 100, 0 to 10,000 ppm as carbon equivalent.

- Sulfur dioxide:

  Bovar Corporation Model 721, version AT or M
  Nondispersive infrared adsorption
  Range: 0 to 500, 0 to 5000 ppm as SO_2.

- Nitrogen oxides:

  Thermo Environmental Company (TECO) Model 42H
  Chemiluminescence
  Range: Between 0 to 25 and 0 to 5000 ppm as NO or as NO_X ; NO_2 by difference.

  API Model 200
  Chemiluminescence
  Range: Between 0 to 100 and 0 to 10,000 ppm as NO or NO_X; NO_2 by difference.

- Carbon monoxide:

  TECO Model 48 or 48H
  Gas correlation nondispersive infrared
  Range: 0 to 10 and 0 to 1,000 ppm (Model 48) and 0 to 10,000 ppm (Model 48H).

  API Model 100
  Gas correlation nondispersive infrared
  Range: 0 to 100 and 0 to 1,000 ppm.

- Carbon dioxide:

  Fugi/ACS Model 760
  Nondispersive infrared
  Range: 0 to 20 %.

- Oxygen:

  Siemens Oxymat 5E
  Paramagnetic
  Range: 0 to 25 %.

  Servomex 1400
  Paramagnetic
  Range: 0 to 25 %.

EPA Reference Methods

The performance parameters for the EPA Reference Methods are presented in Table 1.

The universal WESTON calibration performance requirements, applicable to all parameters, are the following:

- Calibration error: ± 2%
- Calibration bias: ± 2%
- Calibration drift: ± 3%

All parameters will be calibrated using zero plus three upscale gas standards. All sample data will be corrected using the EPA method 6C bias correction.

$$C_{corrected} = \frac{(C_{raw} - Z_b)}{(S_b - Z_b)} \times S_{std}$$

Where:

$C_{corrected}$ = Run average concentration corrected for instrument bias and drift.
C_{raw} = Raw run average concentration before correction.
Z_b = Average pre- and posttest zero bias response.
S_b = Average pre and posttest upscale bias response.
S_{std} = True value of upscale bias standard.

TABLE 1. PERFORMANCE PARAMETERS FOR EPA REFERENCE METHODS

Parameter	Method	Calibration Gas (% F_s)(a)	Calibration Error (% F_s)(b)	Calibration Bias (% F_s)(c)	Calibration Drift (% F_s)	Interference Check	Calibration Bias Drift Correction	Other Requirements
O_2	3A	Zero - 0 Low - N/R Mid - 40 to 60 High - 80 to 100	± 2 % F_s	± 5 % F_s	± 3 % F_s/run	Per Method 20(d)	Per Method 6C	
CO_2	3A	Zero - 0 Low - N/R Mid - 40 to 60 High - 80 to 100	± 2 % F_s	± 5 % F_s	± 3 % F_s/run	Per Method 20(d)	Per Method 6C	
SO_2	6C	Zero - 0 Low - N/R Mid - 40 to 60 High - 80 to 100	± 2 % F_s	± 5 % F_s	± 3 % F_s/run	7% of Method 6C(e)	Linear correction for average bias response	
CO	10	Zero - 0 Low - N/R Mid - Approx. 30 High - Approx. 60	± 2 % F_s(f)	± 2 % F_s(f)	± 10 % F_s/8 hrs	For CO_2 and H_2O	Per Method 6C(g)	
NO_X	7E	Zero - 0 Low - N/R Mid - 40 to 60 High - 80 to 100	± 2 % F_s	± 5 % F_s	± 3 % F_s/run	Per Method 20	Per Method 6C	NO_2/NO converter efficiency 98% minimum.
THC	25A	Zero - 0 Low 25 to 35 Mid - 40 to 60 High - 80 to 90	± 5 % C_g(g)	± 5 % C_g(h)	± 3 % F_s/run	N/R	Per Method 6C(g)	Pretest calibration required within 2 hours of start of test run.

N/R = Not required by method.
F_s = Instrument full scale or span value.
C_g = Calibration gas value
a % F_s = Percent full scale of calibration range.
b Calibration error = difference between known calibration value and instrument response when injected directly into instrument.
c Calibration bias = difference between instrument response when calibration gas is injected directly into the instrument and when calibration gas is injected at the sample probe.
d Substitute 500-ppm NO for oxygen or carbon dioxide during interference check.
e Required for first use at a source category only.
f Difference between calibration error and calibration bias is not specified in method; CO accuracy requirement is applied to both.
g Not specific method, but required as WESTON basic operating procedure.
h According to method, all calibrations are conducted from probe.

Stack CEM QC Sampling Procedures

The following QC procedures will be applied to ensure collection of representative CEM data.

- CEMs (probe to sample conditioner) will be leak-checked prior to the testing.
- All CEMs will be calibrated prior to testing to ensure precise and accurate data. Cylinder gases with a certified accuracy of ±2 % or Protocol One standards will be used to calibrate each of the analyzers. Each analyzer will be calibrated at four points (zero, low, mid, and high range). Nitrogen- or hydrocarbon-free air will be used to set the instrument zero. The three calibration standards will be approximately 20 to 30, 45 to 55, and 80 to 100 % of span.
- Pre- and posttest calibration bias tests will be performed for each test run. The bias check will be performed with the calibration standard that is closest to the observed concentration in the sample gas. The average pretest/posttest bias drift will not exceed 3 % of full scale.
- A permanent data record of CEM analyzer responses will be made on a strip chart data logger and on the sampling data sheets.

POLYNUCLEAR AROMATIC HYDROCARBONS by HPLC 5506

Formulae: Table 1 MW: Table 1 CAS: Table 2 RTECS: Table 2

METHOD: 5506, Issue 3	**EVALUATION:** PARTIAL	Issue 1: 15 May 1985 Issue 3: 15 January 1998
OSHA: Table 3 **NIOSH:** Table 3 **ACGIH:** Table 3	**PROPERTIES:** Table 1	

Compounds

acenaphthene	benzo[ghi]perylene	fluorene
acenaphthylene	benzo[a]pyrene	indeno[1,2,3-cd]pyrene
anthracene	benzo[e]pyrene	naphthalene
benz[a]anthracene	chrysene	phenanthrene
benzo[b]fluoranthene	dibenz[a,h]anthracene	pyrene
benzo[k]fluoranthene	fluoranthene	

NAMES & SYNONYMS: Polycyclic aromatic hydrocarbons, PAHs; also see Table 2.

SAMPLING

SAMPLER:	FILTER + SORBENT TUBE (37-mm, 2-µm, PTFE + washed XAD-2, 100 mg/50 mg)
FLOW RATE:	2 L/min
VOL-MIN:	200 L
-MAX:	1000 L
SHIPMENT:	transfer filters to culture tubes; wrap sorbent and culture tubes in Al foil; ship @ 0 °C
SAMPLE STABILITY:	unknown; protect from heat and UV light
FIELD BLANKS:	3 to 10 field blanks per set
MEDIA BLANKS:	6 to 10 media blanks per set

ACCURACY

RANGE STUDIED:	not determined
BIAS:	not determined
OVERALL PRECISION ($\hat{S}_{rT}$):	not determined
ACCURACY:	not determined

MEASUREMENT

TECHNIQUE:	HPLC, FLUORESCENCE/UV DETECTION
ANALYTE:	compounds listed above
EXTRACTION:	5 mL acetonitrile; ultrasonic bath, 30 to 60 minutes
INJECTION VOLUME:	10 to 50 µL
MOBILE PHASE:	acetonitrile/water gradient @ ambient temperature, 1 mL/min
COLUMN:	250 x 4.6-mm, reversed-phase, 5-µm C_{18}
DETECTOR:	UV @ 254 nm; fluorescence @ 340 nm (excitation), 425 nm (emission)
CALIBRATION:	standards in acetonitrile
RANGE:	see EVALUATION OF METHOD
ESTIMATED LOD:	see EVALUATION OF METHOD
PRECISION ($\bar{S}_r$):	see EVALUATION OF METHOD

APPLICABILITY: This method is applicable to samples that can be extracted with acetonitrile. This method is not applicable to samples that require a different extraction solvent or contain large amounts of highly adsorptive particulate matter, e.g., fly ash or diesel soot; also, this method is not applicable to asphalt fume samples.

INTERFERENCES: Any compound that elutes at the same HPLC retention time may interfere. Heat, ozone, NO_2, or UV light may cause sample degradation.

OTHER METHODS: This revises P&CAM 206 and 251 [1]. Method 5515 uses the same sampling technique, with gas chromatographic measurement [2]. Method 5800 uses the same sampling technique, and a flow-injection method to determine total polycyclic aromatic compounds at two different sets of fluorescent wavelengths [3].

REAGENTS:

1. Water, distilled, deionized, degassed
2. Acetonitrile, HPLC grade, degassed.
3. PAH test mixture,* a liquid standard containing the PAHs except benzo[e]pyrene (EPA 610 Polynuclear Aromatic Hydrocarbons Supelco, Cat. No. 4-8743; or equivalent).
4. Benzo[e]pyrene,* solid (Supelco, Cat. No. 44-2475; or equivalent).

* See SPECIAL PRECAUTIONS

EQUIPMENT:

1. Sampler:
   a. Filter. 37-mm, 2-µm pore size, PTFE membrane filter laminated to PTFE, (Zefluor, Pall Gelman Sciences, Cat. No. P5PJ037; SKC Inc., Cat. No. 225-17-07; or equivalent filter), cellulose spacer ring, 37-mm OD, 32-mm ID, (SKC Inc., Cat. No. 225-23; or equivalent) in a 37-mm cassette filter holder.
      NOTE: If sampling is to be done in bright sunlight, use opaque or foil-wrapped cassettes to prevent sample degradation.
   b. Sorbent tube, washed XAD-2 resin (front = 100 mg; back = 50 mg) (ORBO 43, Supelco, Cat. No. 2-0258; or equivalent), connected to filter with minimum length of PVC tubing. Plastic caps are required after sampling.
      NOTE: If pressure drop is excessive or pump fails, use a larger diameter sorbent tube with XAD-2 resin (ORBO 42 Large, Supelco, Cat. No. 2-0264U; or equivalent).
2. Personal sampling pump capable of operating for 8 h at 2 L/min, with flexible connecting tubing.
3. Aluminum foil.
4. Refrigerant, bagged.
5. Culture tubes, PTFE-lined screw cap, 13-mm x 100-mm
6. Forceps
7. Syringe filters, 0.45-µm, 25-mm, PTFE (Acrodisc-CR, Pall Gelman Sciences, Cat. No 4219; or equivalent).
8. Pipet, 5-mL.
9. Syringe or micropipets, 1- to 100-µL.
10. Ultrasonic bath.
11. HPLC, with gradient capability, fluorescence (excitation @ 340 nm, emission @ 425 nm) and UV (254 nm) detectors in series, electronic integrator, and a 250 x 4.6-mm C_{18} column (Vydac 201TP, The Separations Group, Hesperia, CA, Cat. No. 201TP54; or equivalent).
12. Volumetric flasks, 10- and 100-mL.
13. Recommendation: lighting in laboratory should be incandescent or UV-shielded fluorescent.

SPECIAL PRECAUTIONS: Treat all polynuclear aromatic hydrocarbons as carcinogens. Samples and unused standards are considered toxic waste. Dispose of in an appropriate manner. Counter tops and equipment should be checked regularly with a "black light" for fluorescence as an indicator of contamination by PAHs.

SAMPLING:

1. Calibrate each personal sampling pump with a representative sampler in line.
2. Take personal samples at 2 L/min for a total sample size of 200 to 1000 L.
3. Immediately after sampling, transfer the filter carefully with forceps to a culture tube. Hold filter at edge to avoid disturbing the collected sample. Cap the tube and wrap in aluminum foil.
   NOTE: This step is necessary to avoid loss of analytes by sublimation.
4. Cap the sorbent tube and wrap in aluminum foil.
5. Ship to laboratory in insulated container with bagged refrigerant.

SAMPLE PREPARATION:

NOTE: UV light may degrade PAHs; therefore, recommend using yellow, UV-absorbing shields for fluorescent lights or use incandescent lighting.

6. Refrigerate samples upon receipt at laboratory.
7. Extract PAH from filters.
   a. Add 5.0 mL of acetonitrile to each culture tube containing a filter. Similarly, add 5.0 mL of acetonitrile to each culture tube containing the media and reagent blanks. Cap the tubes.
   b. Place capped tubes in an ultrasonic bath for 30 to 60 min.
8. Desorb PAH from sorbent.
   a. Score each sorbent tube with a file in front of the front (larger) sorbent section. Break tube at score line.
   b. Transfer front glass wool plug and front sorbent section to a culture tube. Transfer back sorbent section, and the middle glass wool plug to a second culture tube.
   c. Add 5.0 mL acetonitrile to each culture tube. Cap the tubes.
   d. Place capped tubes in an ultrasonic bath for 30 to 60 min.
9. Filter all sample extracts through an 0.45-µm syringe filter.

CALIBRATION AND QUALITY CONTROL:

10. Calibrate daily with at least six working standards.
    NOTE: If a benzo[e]pyrene standard is needed, weigh desired amount and add to a known volume of the PAH test mixture.
    a. Dilute aliquots of the PAH test mixture (containing benzo[e]pyrene if needed) with acetonitrile in 10-mL volumetric flasks. The concentration range should cover most of the PAH concentrations in the samples.
    b. During analysis, intersperse working standards with samples and blanks.
    c. Prepare calibration graphs (peak area vs. µg of each PAH per sample).
11. Recovery and desorption efficiency.
    a. Determine recovery (R) from filters and desorption efficiency (DE) from sorbent tubes at least once for each lot of filters and sorbent tubes used in the range of interest.
       (1) Filters. Using a microliter syringe or a micropipette, spike four filters at each of five concentration levels with a mixture of the analytes. Allow the filters to dry in the dark overnight. Analyze the filters (steps 7, 9, and 13 through 15). Prepare graphs of R vs. amounts found.
       (2) Sorbent tubes. Transfer an unused front sorbent section to a culture tube. Prepare a total of 24 culture tubes in order to measure DE at five concentration levels plus blank in quadruplicate. Using a microliter syringe or micropipette, add calibration stock solution directly to sorbent. Cap culture tubes and allow to stand overnight. Desorb and analyze (steps 8, 9, and 13 through 15). Prepare graphs of DE vs. amounts found.
    b. Check R and DE at two levels for each sample set, in duplicate. Repeat determination of R or DE graphs if checks do not agree to within ±5% of R or DE graph.
12. Analyze at least three field blanks for each sample medium.

MEASUREMENT:

13. Set HPLC according to manufacturer's instructions, conditions on page 5506-1 and steps 14 and 15.
14. Inject sample aliquot (10 to 50 µL). Start mobile phase gradient:
    a. Linear gradient from 60% acetonitrile/40% deionized water to 100% acetonitrile at 1 mL/min over 20 min.
    b. Hold at 100% acetonitrile for 20 min.
    c. Linear gradient to initial condition, 5 min.
15. Measure peak areas for each analyte using the appropriate detector as specified in Table 1.

    NOTE 1: The order of elution for the PAHs appears in Table 4.

    NOTE 2: If peak area is above the calibration range, dilute with acetonitrile, reanalyze, and apply dilution factor in calculations.

    NOTE 3: If sample has many interferences, additional sample cleanup may be necessary.

CALCULATIONS:

16. Read the mass, µg (corrected for R or DE) of each analyte found on the filter (W) and front sorbent (W_f) and back sorbent (W_b) sections, and on the average media blank filter (B) and front sorbent (B_f) and back sorbent (B_b) sections from the calibration graphs.
17. Calculate concentration, C (mg/m³), as the sum of the particulate concentration and the vapor concentration in the actual air volume sampled, V (L).

$$C = \frac{(W + W_f + W_b - B - B_f - B_b)}{V}, \text{ mg/m}^3$$

NOTE 1: µg/mL = mg/m³

NOTE 2: W_f and W_b include analyte originally collected on the filter as particulate, then volatilized during sampling. This can be a significant fraction for many PAHs (e.g., anthracene, fluoranthene, fluorene, naphthalene, phenanthrene).

EVALUATION OF METHOD:

The UV detector is used to analyze for some PAHs (see Table 1), and the remaining PAHs are analyzed by a fluorescent detector, which gave better sensitivity for some PAHs. The ranges of the limit of detection (LOD) and the limit of quantitation (LOQ) values for the 17 PAHs are reported in Table 4 [4]. The LOD and LOQ values varied because of differences in the detectors used and the concentrations of the standards. Therefore, it is important that the LOD and LOQ values be determined for each set of samples. The LOQs are the lower end of the analytical ranges. The upper end of the analytical ranges were not determined.

This method was evaluated by means of a user check [5]. An independent laboratory prepared spiked filters and sorbent tubes for a recovery and desorption efficiency study (see Table 4). For the filters, except naphthalene, the recovery results were greater than or equal to 75%. Since naphthalene is fairly volatile under ambient conditions, this may account for the poor recovery results. For the sorbent tubes, only four of the 17 analytes had desorption efficiencies that were greater than or equal to 75%. During the user check, the sorbent tubes were extracted by adding 5 mL acetonitrile and were allowed to stand for 30 minutes with occasional swirling. In more recent quality control experiments, the desorption efficiencies were often better for some analytes (see Table 4) [4]. These results were achieved using an ultrasonic bath for 30 to 60 minutes. The results indicated the importance of preparing media spikes for recovery and desorption efficiency studies for each set of samples; moreover, the results reenforce this need when using new lots of media.

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METHOD REVISED BY:

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TABLE 1. FORMULAS AND PHYSICAL PROPERTIES.

COMPOUND (by M.W.)	FORMULA	WEIGHT	DETECTOR	MELTING POINT (°C)	BOILING POINT (°C)	REFERENCE
1. NAPHTHALENE	$C_{10}H_8$	128.17	UV	80.2	218	[6]
2. ACENAPHTHYLENE	$C_{12}H_8$	152.20	UV	92.5	280	[6]
3. ACENAPHTHENE	$C_{12}H_{10}$	154.21	UV	93.4	279	[6]
4. FLUORENE	$C_{13}H_{10}$	166.22	UV	115	295	[6]
5. ANTHRACENE	$C_{14}H_{10}$	178.23	UV	215	340	[6]
6. PHENANTHRENE	$C_{14}H_{10}$	178.23	UV	99.2	340	[6
7. FLUORANTHENE	$C_{16}H_{10}$	202.26	FL	108	384	[6]
8. PYRENE	$C_{16}H_{10}$	202.26	FL	151	404	[6]
9. BENZ[a]ANTHRACENE	$C_{18}H_{12}$	228.29	FL	167	435	[7]
10. CHRYSENE	$C_{18}H_{12}$	228.29	UV	258	448	[6]
11. BENZO[b]FLUORANTHENE	$C_{20}H_{12}$	252.32	FL	168	–	[7]
12. BENZO[k]FLUORANTHENE	$C_{20}H_{12}$	252.32	FL	217	480	[6]
13. BENZO[a]PYRENE	$C_{20}H_{12}$	252.32	FL	177	495	[6, 8]
14. BENZO[e]PYRENE	$C_{20}H_{12}$	252.32	FL	178	311	[6]
15. BENZO[ghi]PERYLENE	$C_{22}H_{12}$	276.34	FL	278	–	[7]
16. INDENO[1,2,3-cd]PYRENE	$C_{22}H_{12}$	276.34	FL	164	–	[7]
17. DIBENZ[a,h]ANTHRACENE	$C_{22}H_{14}$	278.35	FL	270	524	[7, 8]

TABLE 2. SYNONYMS, CAS AND RTECS NUMBERS.

COMPOUND (alphabetically)	SYNONYMS, CAS and RTECS Numbers*
1. ACENAPHTHENE	CAS # 83-32-9; RTECS # AB1000000
2. ACENAPHTHYLENE	acenaphthalene; CAS # 208-96-8; RTECS # AB1254000
3. ANTHRACENE	CAS # 120-12-7; RTECS # CA9350000
4. BENZ[a]ANTHRACENE	1,2-benzanthracene; benzo[b]phenanthrene; 2,3-benzophenanthrene; tetraphene; CAS # 56-55-3; RTECS # CV9275000
5. BENZO[b]FLUORANTHENE	3,4-benzofluoranthene; 2,3-benzofluoranthene; benz[e]acephenanthrylene; B(b)F; CAS # 205-99-2; RTECS # CU1400000
6. BENZO[k]FLUORANTHENE	11,12-benzofluoranthene; CAS # 207-08-9; RTECS # DF6350000
7. BENZO[ghi]PERYLENE	1,12-benzoperylene; CAS # 191-24-2; RTECS # DI6200500
8. BENZO[a]PYRENE	3,4-benzopyrene; 6,7-benzopyrene; B(a)P; BP; CAS # 50-32-8; RTECS # DJ3675000
9. BENZO[e]PYRENE	1,2-benzopyrene; 4,5-benzopyrene; B(e)P; CAS # 192-97-2; RTECS # DJ4200000
10. CHRYSENE	1,2-benzophenanthrene; benzo[a]phenanthrene; CAS # 218-01-9; RTECS # GC0700000
11. DIBENZ[a,h]ANTHRACENE	1,2,5,6-dibenzanthracene; CAS # 53-70-3; RTECS # HN2625000
12. FLUORANTHENE	benzo[jk]fluorene; CAS # 206-44-0; RTECS # LL4025000
13. FLUORENE	CAS # 86-73-7; RTECS # LL5670000
14. INDENO[1,2,3-cd]PYRENE	2,3-phenylenepyrene; CAS # 193-39-5; RTECS # NK9300000
15. NAPHTHALENE	naphthene; CAS # 91-20-3; RTECS # QJ0525000
16. PHENANTHRENE	CAS # 85-01-8; RTECS # SF7175000
17. PYRENE	benzo[def]phenanthrene; CAS # 129-00-0; RTECS # UR2450000

* Data from [6, 8, and 9].

TABLE 3. EXPOSURE LIMITS*

COMPOUND	OSHA†	NIOSH‡	ACGIH§
1. ANTHRACENE	0.2 mg/m³	—	
2. BENZ[a]ANTHRACENE	—	—	suspect human carcinogen
3. BENZO[b]FLUORANTHENE	—	—	suspect human carcinogen
4. BENZO[a]PYRENE	0.2 mg/m³	—	suspect human carcinogen
5. CHRYSENE	0.2 mg/m³	potential occupational carcinogen§	animal carcinogen
6. NAPHTHALENE	10 ppm; STEL 15 ppm	10 ppm; STEL 15 ppm	10 ppm; STEL 15 ppm
7. PHENANTHRENE	0.2 mg/m³	—	—
8. PYRENE	0.2 mg/m³	—	—

* This table only includes the compounds with established exposure limit values.
† Information from [10].
‡ Information from [11].
§ Information from [12].

TABLE 4. LOD AND LOQ VALUES, AND RECOVERY DATA.

COMPOUND (by elution order)	Range of values*		Recoveries (%)†	
	LOD (µg per sample)	LOQ (µg per sample)	Filters	Sorbent tubes
1. NAPHTHALENE	0.20 - 0.80	0.39 - 2.6	49.6	68.5
2. ACENAPHTHYLENE	0.090 - 2.0	0.28 - 6.6	98.2	98.2
3. ACENAPHTHENE	0.20 - 5.0	0.58 - 16.	–	–
4. FLUORENE	0.030 - 0.30	0.099 - 0.26	95.0	95.0
5. PHENANTHRENE	0.0070 - 0.060	0.023 - 0.19	99.0, 90.4*	84.0, 92.5*, 82.6*
6. ANTHRACENE	0.0010 - 0.090	0.023 - 0.30	81.8, 94.4*	72.8, 96.2*, 72.9*
7. FLUORANTHENE	0.0020 - 0.090	0.0066 - 0.30	94.9, 90.4*	73.0, 93.5*, 81.7*
8. PYRENE	0.0010 - 0.30	0.0036 - 0.99	94.4, 76.1*	84.9, 77.0*, 75.9*
9. BENZ[a]ANTHRACENE	0.0010 - 0.090	0.0042 - 0.30	86.6, 92.7*	62.4, 95.0*, 72.3*
10. CHRYSENE	0.0070 - 0.20	0.023 - 0.37	94.6, 89.9*	62.7, 89.8*, 74.0*
11. BENZO[e]PYRENE	0.0060 - 0.80	0.020 - 2.6	110	48.3
12. BENZO[b]FLUORANTHENE	0.0030 - 0.20	0.011 - 0.66	94.8	64.2
13. BENZO[k]FLUORANTHENE	0.0020 - 0.040	0.0054 - 0.13	103	53.2
14. BENZO[a]PYRENE	0.0020 - 0.10	0.0051 - 0.33	101, 88.1*	50.4, 91.6*, 68.4*
15. DIBENZ[a,h]ANTHRACENE	0.0040 - 0.60	0.014 - 2.0	76.5	61.0
16. BENZO[ghi]PERYLENE	0.0030 - 0.50	0.011 - 1.7	76.5	61.0
17. INDENO[1,2,3-cd]PYRENE	0.0090 - 0.20	0.027 - 0.66	91.6	36.5

* Data from [4].
† Data from [5]

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APPENDIX B

EXAMPLE CALCULATIONS

NOMENCLATURE AND DIMENSIONS

An	=	Cross-sectional area of sampling nozzle, sq.ft.
As	=	Cross-sectional area of stack, sq.ft.
Bws	=	Proportion by volume of water vapor in the gas stream, dimensionless
Cp	=	Pitot tube coefficient, dimensionless
Cs	=	Concentration of pollutant matter in stack gas – dry basis, grains per standard cubic foot (gr/dscf)
% CO	=	Percent of carbon monoxide by volume, dry basis
% CO_2	=	Percent of carbon dioxide by volume, dry basis
ΔH	=	Average pressure drop across the sampling meter flow orifice, inches of water (in.H_20)
GCV	=	Gross calorific value, Btu/lb
I	=	Percent of isokinetic sampling
La	=	Maximum acceptable leakage rate for either a pretest leak check or for a leak check following a component change; equal to 0.020 cubic foot per minute or 4% of the average sampling rate, whichever is less
Md	=	Dry molecular weight, lb/lb-mole
Mn	=	Total amount of pollutant matter collected, milligrams (mg)
Ms	=	Molecular weight of stack gas (wet basis), lb/lb-mole
% N_2	=	Percent of nitrogen by volume, dry basis
% O_2	=	Percent of oxygen by volume, dry basis
ΔP	=	Velocity head of stack gas, inches of water (in.H_2O)
Pbar	=	Barometric pressure, inches of mercury (in.Hg)

NOMENCLATURE AND DIMENSIONS (continued)

Ps	=	Absolute stack gas pressure, inches of mercury (in.Hg)
Pstd	=	Gas pressure at standard conditions, inches of mercury (29.92 in.Hg)
pmr	=	Pollutant matter emission rate, pounds per hour (lb/h)
Qs	=	Volumetric flow rate – wet basis at stack conditions, actual cubic feet per minute (acfm)
Qsstd	=	Volumetric flow rate – dry basis at standard conditions, dry standard cubic feet per minute (dscfm)
Tm	=	Average temperature of dry gas meter, °R
Ts	=	Average temperature of stack gas, °R
Tstd	=	Temperature at standard conditions, (528°R)
Vlc	=	Total volume of liquid collected in impingers and silica gel, ml
Vm	=	Volume of dry gas sampled at meter conditions, cu. ft.
Vmstd	=	Volume of dry gas sampled at standard conditions, cu. ft.
Vs	=	Average stack gas velocity at stack conditions, ft/s
Vwstd	=	Volume of water vapor at standard conditions, scf
Y	=	Dry gas meter calibration factor, dimensionless
⌀	=	Total sampling time, minutes

NOTE: Standard condition = 68°F and 29.92 in.Hg

EXAMPLE CALCULATIONS FOR POLLUTANT EMISSIONS

1. Volume of dry gas sampled corrected to standard conditions, ft^3.
   Note: Vm must be corrected for leakage if any leakage rates exceed La.

$$Vmstd = 17.647 \, x \, Vm \, x \, Y \left[\frac{Pbar + \frac{\Delta H}{13.6}}{TM, ^\circ R} \right]$$

2. Volume of water vapor at standard conditions, ft^3.

$$Vwstd = 0.04707 \text{ x } Vlc$$

3. Moisture content in stack gas, dimensionless.

$$Bws = \frac{Vwstd}{Vwstd + Vmstd}$$

4. Dry molecular weight of stack gas, lb/lb-mole.

$$Md = 0.44\ (\%\ CO_2) + 0.32\ (\%\ O_2) + 0.28\ (\%\ N_2 + \%\ CO)$$

5. Molecular weight of stack gas, lb/lb-mole.

$$Ms = Md(1\text{-}Bws) + 18Bws$$

6. Stack velocity at stack conditions, f/s.

$$Vs = (85.49)\ (Cp)\ \left(avg \sqrt{\Delta} P\right) \sqrt{\frac{Ts, ^\circ R}{(Ps)(Ms)}}$$

7. Stack gas volumetric flow rate at stack conditions, cfm.

$$Qs = 60 \text{ x } Vs \text{ x } As$$

8. Dry stack gas volumetric flow rate at standard conditions, cfm.

$$Qsstd = (17.647)\ (Qs) \left(\frac{Ps}{Ts}\right) (1 - Bws)$$

EXAMPLE CALCULATIONS FOR POLLUTANT EMISSIONS (continued)

9. Isokinetic Rate, %.

$$Iso = \frac{(0.0945 \times Ts, {}^\circ R \times Vmstd)}{(1 - Bws) \times (\theta \times Vs \times Ps \times (0.005454 \times Dn^2))}$$

10. Concentration in gr/dscf.

$$Cs = (0.01543)\left(\frac{Mn}{Vmstd}\right)$$

11. Pollutant mass emission rate, lb/h.

$$pmr, lb/hr = \left(\frac{Cs}{7000}\right) x\ Qsstd\ x\ 60$$

12. Pollutant mass emission rate, lb/MM Btu.

$$pmr, lb/MM\ Btu = \left(\frac{pmr, lb/hr}{MM\ Btu/hr}\right)$$

13. F-factor (Fd).

$$Fd = \frac{10^6 (3.64\ x\ \%\ H) + (1.53\ x\ \%\ C) + (0.57\ x\ \%\ S) + (0.14\ x\ \%\ N) - (0.46\ x\ \%\ O_2)}{GCV\ (Btu/lb)}$$

14. F-factor, pollutant mass emission rate, lb/MM Btu (O_2-based).

$$= \frac{lb/dscf\ x\ F\ x\ 20.9}{(20.9 - \%\ O_2)}$$

15. Heat input, MM Btu/hr fuel.

$$= \frac{GVC\ (Btu/lb) * Feed\ Rate\ (lb/hr)}{10^6}$$

16. Heat input, MM Btu/hr, F-factor.

$$= \frac{Qsstd}{Fd} x \left[(20.9 - \%\ O_2) + 20.9\right] x\ 60$$

EXAMPLE CALCULATIONS FOR GASEOUS POLLUTANTS MEASURED BY CONTINUOUS EMISSION MONITORS (CEMs)

1) Concentrations, parts per million, dry basis:

$$\text{ppm, dry} = \text{ppm, wet basis} \div \left(1 - \frac{\text{BWS, \%}}{100}\right)$$

2) Pollutant Mass Emission Rate, pounds per hour.

$$\text{PMR, lb/hr} = \frac{\text{ppm, dry x Compound Molecular Weight}}{(385.3 \times 10^6)} \text{x dscfm x 60}$$

Molecular Weights of Target Compounds

TGO	=	Total Gaseous Organics	16.01 (Methane)
SO_2	=	Sulfur Dioxide	64.05
NO_2	=	Nitrogen Oxides	46.00
CO	=	Carbon Monoxide	28.01
BWS	=	Proportion by Volume of Water Vapor in the Gas Stream	
PMR	=	Pollutant Mass Emission Rate, pounds per hour	
DSCFM	=	Dry standard cubic feet per minute	

HORSE POWER CALCULATIONS

-86 Horsepower Calculation

Example Calculation: Travis AFB, 10% load

Horsepower = Travis Fuel Usage(lbs/hr) / (Southwest Fuel.Usage (lbs/hr) / Brake Horsepower)

Horsepower = 21 36 / (17.3 / 14.6) = 18.03

Location/load	Run No.	Travis Fuel Usage lbs/hr	Southwest Fuel Usage lbs/hr	Brake Horsepower BHP	Brake Specific Fuel Consumption BSFC (=SW Fuel/BHP)	Calculated horsepower ELM Fuel/BSFC)
Travis AFB						
10%	1	21 36	17.3	14.6	1.18	18.03
	2	20 16	17.3	14.6	1.18	17.01
	3	20 51	17.3	14.6	1.18	17.31
Average						17.45
Unit 2 10%	1	20.68	17.30	14.6	1.18	17.45
25%	1	24.81	23.2	37	0.63	39.57
	2	27.3	23.2	37	0.63	43.54
	3	26.85	23.2	37	0.63	42.82
Average						41.98
50%	1	36.02	33.9	73	0.46	77.57
	2	37.89	33.9	73	0.46	81.59
	3	35.18	33.9	73	0.46	75.76
Average						78.30
75%	1	40.51	43.7	107.6	0.41	99.75
	2	45.41	43.7	107.6	0.41	111.81
	3	43.61	43.7	107.6	0.41	107.38
Average						106.31
100%	1	52.12	56.2	144.1	0.39	133.64
	2	57.57	56.2	144.1	0.39	147.61
	3	58.2	56.2	144.1	0.39	149.23
Average						143.49

-86 Horsepower Calculation

Example Calculation: Elmendorf AFB, 10% load
Horsepower = Elmendorf Fuel Usage(lbs/hr) / (Southwest Fuel Usage (lbs/hr) / Brake Horsepower)
Horsepower = 21.49 / (17.3 / 14.6) = 18.14

Location/load	Run No.	Elmenorf Fuel Usage lbs/hr	Southwest Fuel Usage lbs/hr	Brake Horsepower BHP	Brake Specific Fuel Consumption BSFC (=SW Fuel/BHP)	Calculated horsepower (=ELM Fuel/BSFC)
Elmendorf AFB						
10%	1	21.49	17.3	14.6	1.18	18.14
	2	22.79	17.3	14.6	1.18	19.23
	3	19.95	17.3	14.6	1.18	16.84
Average		21.41				18.07
25%	1	26.86	23.2	37	0.63	42.84
	2	26.45	23.2	37	0.63	42.18
	3	26.50	23.2	37	0.63	42.26
Average		26.60				42.43
50%	1	39.57	33.9	73	0.46	85.21
	2	39.94	33.9	73	0.46	86.01
	3	42.09	33.9	73	0.46	90.64
Average						87.28
75%	1	49.47	43.7	107.6	0.41	121.81
	2	52.02	43.7	107 6	0.41	128.09
	3	50 55	43 7	107 6	0.41	124.47
Average						124.79
100%	1	49.65	56.2	144.1	0.39	127 31
	2	49.97	56.2	144.1	0 39	128.13
	3	49.51	56.2	144.1	0.39	126.95
Average						127.46

CEM – GASEOUS POLLUTANTS
(CO, CO_2, O_2, THC, NO_X) –
TRAVIS AFB

CEM CALIBRATION DATA

Plant Name	Travis AFB	Plant Rep.	Mark Wade
Sampling Location	10% Load - Generator 1	Team Leader	Tom Gerstle
Date	06/11/2002	CEM Operator	Doug Allen
Run Number	1	Project Number	030174.0003.002
Start Time	0817		
Stop Time	0917		

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	SYSTEM CAL CHECK PRETEST System Response	PRETEST Syst. Bias (% of Span)	POST TEST System Response	POST TEST Syst. Bias (% of Span)	Drift (% of Span)	Calibration Correction Factors
CO Zero	0	0		0.3	0.2	0.4	-0.1	0.3	0.0	-0.1	Co=0.4
CO Low	~30	30.1		30.3	0.1						
CO Mid	~60	59.4		59.1	-0.1	59.1	0.0	58.9	-0.1	-0.1	Cm=59.0
CO High	80-100 (2)	149.4		150.4	0.5						
CO2 Zero	0	0		0	0.0	-0.1	-0.4	0	0.0	0.4	-Co=0.1
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	10	0.0	10	-0.0	0.0	Cm=10.0
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		0	0.0	0	0.0	0	0.0	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		20	0.0	20	0.0	20	0.0	0.0	Cm=20.0
THC Zero	0	0		-0.2		-0.1	0.0	4		1.4	
THC Low	25-35	49.6		50.3	1.4	50.2	0.0	54.2		1.3	
THC Mid	45-55	124.6		125	0.3	126	0.3				
THC High	80-90	298.6		300		299	-0.3				
NOx Zero	0	0		-1	-0.1	0.1	0.1	1	0.2	0.1	Co=0.6
NOx Low	20-30 (3)										
NOx Mid	45-55	448		443	-0.5	441	-0.2	441	-0.2	0.0	Cm=441.0
NOx High	80-90	885.5		886	0.1						

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	10% Load - Generator 1
Date	06/11/02
Run Number	2
Start Time	1010
Stop Time	1050

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	SYSTEM CAL CHECK PRETEST System Response	PRETEST Syst. Bias (% of Span)	POST TEST System Response	POST TEST Syst. Bias (% of Span)	Drift (% of Span)	Calibration Correction Factors
CO Zero	0	0		0.3	0.2	0.3	0.0	0.4	0.1	0.1	Co=0.4
CO Low	~30	30.1		30.3	0.1						
CO Mid	~60	59.4		59.1	-0.1	58.9	-0.1	58.7	-0.2	-0.1	Cm=58.8
CO High	80-100 (2)	149.4		150.4	0.5						
CO2 Zero	0	0		0	0.0	0	0.0	-0.1	-0.4	-0.4	-Co=0.1
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	10	0.0	10	0.0	0.0	Cm=10.0
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		0	0.0	0	0.0	0	0.0	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		20	0.0	20	0.0	20	0.0	0.0	Cm=20.0
THC Zero	0	0		-0.2		4	1.4	4.5		0.2	
THC Low	25-35	49.6		50.3	1.4	54.2	1.3	54.3		0.0	
THC Mid	45-55	124.6		125	0.3						
THC High	80-90	298.6		300							
NOx Zero	0	0		-1	-0.1	1	0.2	0.1	0.1	-0.1	Co=0.6
NOx Low	20-30 (3)										
NOx Mid	45-55	448		443	-0.5	441	-0.2	440	-0.3	-0.1	Cm=440.5
NOx High	80-90	885.5		886	0.1						

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	10% Load - Generator 1
Date	06/11/02
Run Number	3
Start Time	1135
Stop Time	1215

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	SYSTEM CAL CHECK PRETEST System Response	PRETEST Syst. Bias (% of Span)	POST TEST System Response	POST TEST Syst. Bias (% of Span)	Drift (% of Span)	Calibration Correction Factors
CO Zero	0	0		0.3	0.2	0.4	-0.1	0.2	-0.1	-0.1	Co=0.3
CO Low	~30	30.1		30.3	0.1						
CO Mid	~60	59.4		59.1	-0.1	58.7	-0.2	58.3	-0.4	-0.2	Cm=58.5
CO High	80-100 (2)	149.4		150.4	0.5						
CO2 Zero	0	0		0	0.0	-0.1	-0.4	-0.2	-0.8	-0.4	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	10	0.0	9.9	-0.4	-0.4	Cm=10.0
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		0	0.0	0	0.0	0	0.0	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		20	0.0	20	0.0	20	0.0	0.0	Cm=20.0
THC Zero	0	0		-0.2		4.5	1.6	3.8		-0.2	
THC Low	25-35	49.6		50.3	1.4	54.3	1.3	51.7		-0.9	
THC Mid	45-55	124.6		125	0.3						
THC High	80-90	298.6		300							
NOx Zero	0	0		-1	-0.1	0.1	0.1	1.1	0.2	0.1	Co=0.6
NOx Low	20-30 (3)										
NOx Mid	45-55	448		443	-0.5	440	-0.3	438	-0.5	-0.2	Cm=439.0
NOx High	80-90	885.5		886	0.1						

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 10% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 1

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/11/2002	8:17:46	77.34	3.324	16.446	48.66	152.8	2.42
06/11/2002	8:18:46	77.74	3.288	16.465	48.85	152.4	2.41
06/11/2002	8:19:46	77.63	3.282	16.486	49.61	151.2	2.4
06/11/2002	8:20:46	77.8	3.272	16.506	49.43	151.2	2.39
06/11/2002	8:21:46	76.93	3.258	16.51	50.07	151.2	2.38
06/11/2002	8:22:46	77.62	3.274	16.515	49.92	150.6	2.35
06/11/2002	8:23:46	78.03	3.244	16.519	50.41	150.2	2.32
06/11/2002	8:24:46	77.73	3.252	16.529	50.31	150.2	2.21
06/11/2002	8:25:46	77.72	3.24	16.534	50.98	149.7	2.29
06/11/2002	8:26:46	77.96	3.188	16.597	50.7	150.1	2.2
06/11/2002	8:27:47	77.49	3.176	16.641	51.44	148.2	2.18
06/11/2002	8:28:47	78.69	3.147	16.642	51.92	147.4	2.03
06/11/2002	8:29:47	77.49	3.17	16.645	51.11	148.9	1.85
06/11/2002	8:30:47	77.45	3.16	16.639	52.37	149.9	1.9
06/11/2002	8:31:47	78.63	3.154	16.644	51.52	149.2	1.87
06/11/2002	8:32:47	77.63	3.172	16.635	52.05	149.9	1.85
06/11/2002	8:33:47	78.34	3.148	16.64	52.92	150.2	1.84
06/11/2002	8:34:47	78.62	3.2	16.61	51.89	150.4	1.83
06/11/2002	8:35:47	77.92	3.186	16.597	52.35	151.6	1.85
06/11/2002	8:36:45	78.85	3.188	16.598	52.78	151.1	1.92
06/11/2002	8:37:45	79.57	3.206	16.593	52.66	149.9	1.89
06/11/2002	8:38:45	79.18	3.189	16.587	52.56	149.2	1.88
06/11/2002	8:39:45	78.51	3.208	16.587	52.62	150.2	1.86
06/11/2002	8:40:45	79.83	3.207	16.575	53.35	150.2	1.86
06/11/2002	8:41:45	80.89	3.201	16.577	52.95	150.2	1.87
06/11/2002	8:42:45	81.36	3.221	16.573	53.55	150.1	1.89
06/11/2002	8:43:45	80.98	3.193	16.575	53.03	149.2	1.88
06/11/2002	8:44:45	80.88	3.223	16.569	53.44	149.2	1.87
06/11/2002	8:45:45	81.53	3.206	16.574	53.17	149.2	1.9
06/11/2002	8:46:45	80.48	3.206	16.575	53.05	149.2	1.86
06/11/2002	8:47:45	81.8	2.815	17.08	57.1	149	1.99
06/11/2002	8:48:45	93.58	2.3	17.769	59.26	131.7	2.25
06/11/2002	8:49:46	95.59	2.331	17.763	59.22	118.1	2.24
06/11/2002	8:50:46	96.6	2.311	17.761	59.65	118.1	2.25
06/11/2002	8:51:46	94.82	2.329	17.752	58.84	118.7	2.22
06/11/2002	8:52:46	90.49	3.151	16.666	53.39	125.3	1.94
06/11/2002	8:53:46	81.49	3.204	16.559	53.36	146.7	1.81
06/11/2002	8:54:46	81.02	3.229	16.561	52.91	149.2	1.78
06/11/2002	8:55:46	80.72	3.204	16.561	53.28	149.6	1.8
06/11/2002	8:56:46	81.42	3.229	16.555	53.35	150.2	1.78
06/11/2002	8:57:46	81.28	3.218	16.558	53.4	150.2	1.79
06/11/2002	8:58:46	80.96	3.161	16.624	53.23	149.8	1.78
06/11/2002	8:59:46	80.78	3.217	16.572	59.69	147.7	1.78
06/11/2002	9:00:46	81.65	3.194	16.571	57.28	149.1	1.77
06/11/2002	9:01:46	81.14	3.226	16.558	56.89	150	1.79
06/11/2002	9:02:46	81.61	3.22	16.55	55.69	149.8	1.79
06/11/2002	9:03:46	81.72	3.229	16.545	55.97	150.2	1.78
06/11/2002	9:04:47	85.07	2.548	17.33	60.35	147.2	1.92
06/11/2002	9:05:47	95.52	2.314	17.746	60.1	123.8	2.18
06/11/2002	9:06:47	93.39	2.853	17.05	55.87	119.7	2.02
06/11/2002	9:07:47	83.87	3.246	16.53	54.62	140.9	1.75
06/11/2002	9:08:47	82.54	3.218	16.543	54.69	151	1.75
06/11/2002	9:09:47	82.41	3.235	16.538	56.35	152.2	1.76
06/11/2002	9:10:47	82.74	3.23	16.537	55.38	151.5	1.76

06/11/2002	9:11:45	81.74	3.21	16.551	54.57	151.2	1.72
06/11/2002	9:12:45	80.36	3.216	16.57	53.94	151 7	1.69
06/11/2002	9:13:45	80.8	3.212	16.555	54.4	153.7	1.68
06/11/2002	9:14:45	82.28	3.229	16.54	54.55	152.6	1.71
06/11/2002	9:15:45	81.15	3.231	16.545	54.82	152.2	1.68
06/11/2002	9:16:45	80.87	3.191	16.569	54.96	152.7	1.7
	Average	81.7	3.1	16.7	53.8	146.8	2.0

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 10% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 2		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/11/2002	10:10:53	79.28	3.182	16.613	51.48	158.5	1.55
06/11/2002	10:11:53	79.83	3.207	16.607	52.63	159.2	1.58
06/11/2002	10:12:53	80.48	3.199	16.607	52.7	159.2	1.59
06/11/2002	10:13:53	80.11	3.193	16.607	52.57	159.1	1.59
06/11/2002	10:14:53	80.13	3.214	16.606	52.64	159.2	1.59
06/11/2002	10:15:53	79.87	3.191	16.604	53.11	159.2	1.6
06/11/2002	10:16:53	78.94	3.211	16.608	52.9	159.2	1.58
06/11/2002	10:17:53	79.46	3.195	16.612	52.67	159.2	1.61
06/11/2002	10:18:53	80.42	3.194	16.611	52.91	158.6	1.64
06/11/2002	10:19:53	80.16	3.203	16.614	53.04	158.2	1.6
06/11/2002	10:20:53	80.61	3.187	16.606	53.78	158.2	1.64
06/11/2002	10:21:53	81.63	3.217	16.6	53.57	158.2	1 62
06/11/2002	10:22:53	81.57	3.199	16.598	53.13	158.2	1.61
06/11/2002	10:23:53	80.88	3.196	16.606	52.98	158.2	1.63
06/11/2002	10:24:53	80.91	3.2	16.609	53.06	158.2	1.59
06/11/2002	10:25:53	81.78	3.195	16.599	53.98	157 9	1.59
06/11/2002	10:26:53	81.86	3.219	16.598	54.58	158.2	1.63
06/11/2002	10:27:54	81.87	3.191	16.603	53.28	158.2	1.58
06/11/2002	10:28:54	80.96	3.21	16.594	53.55	158.2	1.62
06/11/2002	10:29:54	81 54	3.209	16.59	54	158.9	1.57
06/11/2002	10:30:54	81.03	3.202	16.587	53.59	158.7	1.6
06/11/2002	10:31:54	81.21	3.236	16.571	53.4	159.3	1.59
06/11/2002	10:32:54	80.36	3.2	16.581	52.86	159.3	1.54
06/11/2002	10:33:52	80.61	3.224	16.566	53.18	159.2	1.57
06/11/2002	10:34:52	81.5	3.237	16.563	53.81	159.3	1.57
06/11/2002	10:35:52	81.72	3.213	16.566	54.6	159.3	1.57
06/11/2002	10:36:52	81.69	3.238	16.567	54.23	158.6	1.59
06/11/2002	10:37:52	81.36	3.213	16.569	54.97	159	1.62
06/11/2002	10:38:52	81 88	3.216	16.574	55 71	158.9	1.59
06/11/2002	10:39:52	83.39	3.226	16.567	56.44	158.1	1.62
06/11/2002	10:40:52	83.65	3.21	16.571	56.84	157.3	1.64
06/11/2002	10:41:52	83.5	3.239	16.569	56.23	157.3	1.66
06/11/2002	10:42:52	83.29	3.211	16.572	55.38	157 3	1.61
06/11/2002	10:43:52	83.4	3.218	16.576	54.19	157.3	1.67
06/11/2002	10:44:52	83.15	3.22	16.576	53.99	157.3	1.66
06/11/2002	10:45:52	84.19	3.219	16.564	54.45	157.3	1.6
06/11/2002	10:46:52	84.21	3.24	16.563	54.5	157.3	1.63
06/11/2002	10:47:52	84.7	3.209	16.567	54.57	157.3	1.59
06/11/2002	10:48:52	83.43	3.234	16.565	55.26	157.4	1.7
06/11/2002	10:49:53	84.12	3.23	16.557	54.95	157 3	1.68
	Average	81.6	3.2	16.6	53.9	158.4	1.6

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 10% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 3		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/11/2002	11:35:03	84.8	3.229	16.513	49.48	148.9	1.59
06/11/2002	11:36:03	84.01	3.261	16.484	53.15	159.4	1.68
06/11/2002	11:37:03	84.48	3.233	16.479	53.35	160.2	1.67
06/11/2002	11:38:03	85.58	3.25	16.485	53.63	160.2	1.68
06/11/2002	11:39:03	85.51	3.253	16.468	53.1	160.6	1.66
06/11/2002	11:40:03	86.24	3.243	16.475	53.09	161.2	1.66
06/11/2002	11:41:03	86.17	3.26	16.467	53.12	161.2	1.68
06/11/2002	11:42:03	86.07	3.22	16.487	52.98	160.3	1.63
06/11/2002	11:43:03	86.76	3.261	16.48	53.27	160.8	1.69
06/11/2002	11:44:03	86.97	3.254	16.462	53.84	160.9	1.71
06/11/2002	11:45:03	88.19	3.251	16.472	54.05	161.1	1.74
06/11/2002	11:46:03	88.83	3.259	16.47	53.84	160.2	1.72
06/11/2002	11:47:03	87.72	3.249	16.458	54.33	160.3	1.73
06/11/2002	11:48:03	88.53	3.279	16.448	54.05	161.2	1.71
06/11/2002	11:49:03	87.42	3.254	16.452	53.61	161.2	1.69
06/11/2002	11:50:03	88.06	3.26	16.459	53.8	161.2	1.71
06/11/2002	11:51:03	88.93	3.263	16.455	53.49	161.2	1.63
06/11/2002	11:52:04	87.2	3.249	16.456	53.59	161.2	1.66
06/11/2002	11:53:04	89.94	3.275	16.454	53.38	160.5	1.68
06/11/2002	11:54:04	89.46	3.245	16.45	53.56	160.2	1.65
06/11/2002	11:55:04	89.6	3.261	16.448	53.77	160.2	1.66
06/11/2002	11:56:04	89.53	3.26	16.447	53.69	160.2	1.68
06/11/2002	11:57:04	89.66	3.26	16.443	53.64	159.4	1.71
06/11/2002	11:58:04	88.71	3.279	16.44	53.95	159.2	1.71
06/11/2002	11:59:04	89.79	3.246	16.446	53.99	160.1	1.7
06/11/2002	12:00:04	88.84	3.268	16.45	53.65	160.2	1.71
06/11/2002	12:01:04	88.51	3.266	16.442	53.01	160.2	1.7
06/11/2002	12:02:04	89.36	3.255	16.445	52.59	161.1	1.71
06/11/2002	12:03:04	89.65	3.281	16.435	53.21	160.2	1.69
06/11/2002	12:04:04	87.81	3.244	16.44	53.24	160.1	1.66
06/11/2002	12:05:04	88.11	3.273	16.443	53.05	159.4	1.68
06/11/2002	12:06:04	88.41	3.255	16.446	53.25	160.2	1.68
06/11/2002	12:07:04	87.93	3.276	16.424	53.51	160.5	1.68
06/11/2002	12:08:04	89.45	3.29	16.414	53.33	161.2	1.69
06/11/2002	12:09:04	89.67	3.263	16.41	53.99	161.2	1.7
06/11/2002	12:10:04	89.15	3.291	16.419	52.89	161.2	1.66
06/11/2002	12:11:04	88.18	3.251	16.444	52.32	160.9	1.63
06/11/2002	12:12:02	87.04	3.258	16.444	52.82	160.2	1.65
06/11/2002	12:13:02	87.84	3.287	16.424	52.85	160.2	1.65
06/11/2002	12:14:03	87.54	3.251	16.432	52.77	161	1.66
06/11/2002	12:15:03	87.69	3.269	16.436	53.43	160.9	1.67
	Average	87.9	3.3	16.5	53.3	160.2	1.7

Data Summary		CO	CO2	O2	THC	NOx	Methane
Run	Time	ppm	%	%	ppm	ppm	ppm
Run 1	08:17-09:16	81.7	3.1	16.7	53.8	146.8	1.95
Run 2	10:10-10:49	81.6	3.2	16.6	53.9	158.4	1.61
Run 3	11:35-12:15	87.9	3.3	16.5	53.3	160.2	1.68

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 10% Load
Date:	06/11/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO
Molecular Weight:	28.01

Run No.	Start-Stop Time	Raw Data (ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	08:17-09:16	81.7	59.4	0.4	59.0	82.36
2	10:10-10:49	81.6	59.4	0.4	58.8	82.59
3	11:35-12:15	87.9	59.4	0.3	58.5	89.39
					Average	84.78

<u>Calibration Error Correction</u>

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

<u>Mass Emission Rate (lb/hr)</u>

E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000

<u>Mass Emission Rate (lb/1000 lb fuel)</u>

E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 10% Load
Date:	06/11/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	08:17-09:16	3.1	9.9	-0.1	10.0	3.12
2	10:10-10:49	3.2	9.9	-0.1	10.0	3.21
3	11:35-12:15	3.3	9.9	-0.2	10.0	3.34
				Average		3.22

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 10% Load
Date:	06/11/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	O2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	08:17-09:16	16.7	20.0	0.0	20.0	16.70
2	10:10-10:49	16.6	20.0	0.0	20.0	16.59
3	11:35-12:15	16.5	20.0	0.0	20.0	16.45
					Average	16.58

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Total Hydrocarbon Data Correction

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 10% Load
Date:	06/11/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	THC
Molecular Weight:	16.00

			Source Information		Corrected
Run No.	Start-Stop Time	Raw Data (ppm)	Stack Flow (dscfm)	Stack Moisture (%)	Data Dry Basis (ppm)
1	08:17-09:16	53.8	332.70	3.90	55.96
2	10:10-10:49	53.9	332.80	3.47	55.83
3	11:35-12:15	53.3	329.70	3.75	55.39
				Average	55.73

Moisture Correction

Cgas(dry)=Cgas(wet)/(1-(% moisture/100))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas(dry)*MWgas*Qs(dscfm)*60/385300000

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 10% Load
Date:	06/11/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	N0x
Molecular Weight:	46.01

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	08:17-09:16	146.8	448.0	0.6	441.0	148.74
2	10:10-10:49	158.4	448.0	0.6	440.5	160.71
3	11:35-12:15	160.2	448.0	0.6	439.0	163.13
					Average	157.53

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000

Mass Emission Rate (lb/1000 lb fuel)

E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

Date:	Run:	T-10-1				Horsepower:	18.03	
06/11/2002	**Flow (dscfm):**	332.7				**Fuel Usage (gal/hr):**	2.98	
	Moisture (%):	3.9						
	Pollutant:	**NOx**	**CO**	**NMHC**	**THC**	**Methane**	**CO2**	**O2**
	Concentration (ppm or %)	148.74	82 36	54.01	55 96	1.95	3.12	16.70
	Mass Rate (lb/hr)	0.35	0.12	0.04	4.61E-02	1.62E-03	0.01	0.03
	Mass Rate (lb/gal fuel)	0.12	0 04	0.01	0 02	0 00	0.00	0 01
	Mass Rate (gr/hp*hr)	8.93	3.01	1.12	1.16	0.04	0.18	0.70

Date:	Run:	T-10-2				Horsepower:	17.01	
06/11/2002	**Flow (dscfm):**	332.8				**Fuel Usage (gal/hr):**	2.81	
	Moisture (%):	3.47						
	Pollutant:	**NOx**	**CO**	**NMHC**	**THC**	**Methane**	**CO2**	**O2**
	Concentration (ppm or %)	160.71	82 59	54.22	55 83	1 61	3.21	16.59
	Mass Rate (lb/hr)	0.38	0.12	0.04	4.60E-02	1.34E-03	0.01	0.03
	Mass Rate (lb/gal fuel)	0.14	0.04	0.02	0.02	0.00	0.00	0.01
	Mass Rate (gr/hp*hr)	10.23	3.20	1.19	1.23	0.04	0.20	0.73

Date:	Run:	T-10-3				Horsepower:	17.31	
06/11/2002	**Flow (dscfm):**	329.7				**Fuel Usage (gal/hr):**	2.86	
	Moisture (%):	3.75						
	Pollutant:	**NOx**	**CO**	**NMHC**	**THC**	**Methane**	**CO2**	**O2**
	Concentration (ppm or %)	163.13	89.39	53.71	55.39	1.68	3.34	16.45
	Mass Rate (lb/hr)	0.39	0.13	0.04	4.52E-02	1 38E-03	0.01	0.03
	Mass Rate (lb/gal fuel)	0.13	0.04	0.02	0.02	0.00	0.00	0.01
	Mass Rate (gr/hp*hr)	10.11	3.37	1.15	1.19	0.04	0.20	0.71

Date:	Run:	T-2-10				Horsepower:	17.45	
06/13/2002	**Flow (dscfm):**	304				**Fuel Usage (gal/hr):**	2.88	
	Moisture (%):	3.7						
	Pollutant:	**NOx**	**CO**	**NMHC**	**THC**	**Methane**	**CO2**	**O2**
	Concentration (ppm or %)	211.32	153.05	95.36	96.71	1.35	3.28	16.51
	Mass Rate (lb/hr)	0.46	0.20	0.07	7.28E-02	1 02E-03	0.01	0.03
	Mass Rate (lb/gal fuel)	0.16	0.07	0.02	0.03	0.00	0.00	0.01
	Mass Rate (gr/hp*hr)	11.98	5.28	1.87	1.89	0.03	0.18	0.65

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	25% Load - Generator 1
Date	06/11/2002
Run Number	1
Start Time	1304
Stop Time	1344

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.3	0.2	0.2	0.1	0.2	-0.1	0.0	Co=0.2
CO Low	~30	30.1		30.3	0.1						
CO Mid	~60	59.4		59.1	-0.1	58.3	-0.4	57.7	-0.7	-0.3	Cm=58.0
CO High	80-100 (2)	149.4		150.4	0.5						
CO2 Zero	0	0		0	0.0	-0.2	-0.8	-0.1	-0.4	0.4	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	9.9	-0.4	9.9	-0.4	0.0	Cm=9.9
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		0	0.0	0	0.0	0	0.0	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		20	0.0	20	0.0	20	0.0	0.0	Cm=20.0
THC Zero	0	0		-0.2		3.8	1.3	3.6		-0.1	
THC Low	25-35	49.6		50.3	1.4	51.7	0.5	51.6		0.0	
THC Mid	45-55	124.6		125	0.3						
THC High	80-90	298.6		300							
NOx Zero	0	0		-1	-0.1	1.1	0.2	0.1	0.1	-0.1	Co=0.6
NOx Low	20-30 (3)										
NOx Mid	45-55	448		443	-0.5	438	-0.5	435	-0.8	-0.3	Cm=436.5
NOx High	80-90	885.5		886	0.1						

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	25% Load - Generator 1
Date	06/11/02
Run Number	2
Start Time	1420
Stop Time	1500

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.3	0.2	0.2	0.1	0.2	-0.1	0.0	Co=0.2
CO Low	~30	30.1		30.3	0.1						
CO Mid	~60	59.4		59.1	-0.1	57.7	-0.7	57.8	-0.7	0.0	Cm=57.8
CO High	80-100 (2)	149.4		150.4	0.5						
CO2 Zero	0	0		0	0.0	-0.1	-0.4	-0.2	-0.8	-0.4	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	9.9	-0.4	9.9	-0.4	0.0	Cm=9.9
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		0	0.0	0	0.0	0	0.0	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		20	0.0	20	0.0	20	0.0	0.0	Cm=20.0
THC Zero	0	0		-0.2		3.6	1.3	1.9		-0.6	
THC Low	25-35	49.6		50.3	1.4	51.6	0.4	51.2		-0.1	
THC Mid	45-55	124.6		125	0.3						
THC High	80-90	298.6		300							
NOx Zero	0	0		-1	-0.1	0.1	0.1	0	0.1	0.0	Co=0.1
NOx Low	20-30 (3)										
NOx Mid	45-55	448		443	-0.5	435	-0.8	435	-0.8	0.0	Cm=435.0
NOx High	80-90	885.5		886	0.1						

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	25% Load - Generator 1
Date	06/11/02
Run Number	3
Start Time	1535
Stop Time	1615

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.3	0.2	0.2	0.1	0.1	-0.1	-0.1	Co=0.2
CO Low	~30	30.1		30.3	0.1						
CO Mid	~60	59.4		59.1	-0.1	57.8	-0.7	57.7	-0.7	0.0	Cm=57.8
CO High	80-100 (2)	149.4		150.4	0.5						
CO2 Zero	0	0		0	0.0	-0.2	-0.8	-0.2	-0.8	0.0	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	9.9	-0.4	9.9	-0.4	0.0	Cm=9.9
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		0	0.0	0	0.0	0	0.0	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		20	0.0	20	0.0	20	0.0	0.0	Cm=20.0
THC Zero	0	0		-0.2		1.9	0.7	1.3		-0.2	
THC Low	25-35	49.6		50.3	1.4	51.2	0.3	50.6		-0.2	
THC Mid	45-55	124.6		125	0.3						
THC High	80-90	298.6		300							
NOx Zero	0	0		-1	-0.1	0	0.1	-0.1	0.1	0.0	-Co=0.1
NOx Low	20-30 (3)										
NOx Mid	45-55	448		443	-0.5	435	-0.8	434	-0.9	-0.1	Cm=434.5
NOx High	80-90	885.5		886	0.1						

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 25% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 1

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/11/2002	13:04:40	83.47	3.865	15.565	42.24	197.8	1.48
06/11/2002	13:05:41	83.3	3.859	15.569	42.46	197.8	1.48
06/11/2002	13:06:41	82.64	3.847	15.544	42.78	197.2	1.45
06/11/2002	13:07:41	83.16	3.888	15.54	43.04	197.6	1.48
06/11/2002	13:08:41	80.84	3.882	15.53	42.64	198.1	1.45
06/11/2002	13:09:41	81.2	3.878	15.543	42.6	196.8	1.46
06/11/2002	13:10:41	81 17	3.874	15.558	42	196.1	1.43
06/11/2002	13:11:41	81.47	3.852	15.562	42.35	195.2	1.47
06/11/2002	13:12:41	81.83	3.891	15.54	43.22	195.9	1.49
06/11/2002	13:13:41	83.23	3.87	15.534	42:68	196.4	1.48
06/11/2002	13:14:41	82.13	3.874	15.542	42.54	196.6	1.46
06/11/2002	13:15:41	83.25	3.878	15.541	43.29	196.2	1.46
06/11/2002	13:16:41	84.17	3.869	15.534	43.03	195.8	1.48
06/11/2002	13:17:41	83.54	3.892	15.534	43.46	196.2	1.48
06/11/2002	13:18:41	83.25	3.865	15.536	43.6	195.8	1.48
06/11/2002	13:19:41	83.16	3.869	15.548	43.25	195.7	1.48
06/11/2002	13:20:41	81 14	3.857	15.572	43.03	194.8	1.49
06/11/2002	13:21:41	81.28	3.84	15.584	42.35	194.2	1.48
06/11/2002	13:22:41	80.17	3.801	15.66	40.93	194.2	1.47
06/11/2002	13:28:40	85.27	3.857	15.535	43.07	198	1.45
06/11/2002	13:29:40	85.2	3.873	15.53	47 15	197.4	1.63
06/11/2002	13:30:40	84.9	3.884	15.526	48.37	196.6	1.68
06/11/2002	13:31:40	84.24	3.857	15.534	48.31	196.8	1.68
06/11/2002	13:32:40	85.03	3.876	15.544	48.36	196.1	1.67
06/11/2002	13:33:40	83.9	3.858	15.539	48.25	195.2	1.68
06/11/2002	13:34:40	83.86	3.872	15.536	48.61	195.2	1.68
06/11/2002	13:35:40	84.16	3.875	15.528	48.06	195.2	1.68
06/11/2002	13:36:40	83.88	3.868	15.523	48.73	194.9	1.68
06/11/2002	13:37:40	84.82	3.898	15.511	48.74	196.4	1.69
06/11/2002	13:38:40	84.67	3.866	15.517	47.82	197 7	1.66
06/11/2002	13:39:40	83.41	3.886	15.508	48.39	197.2	1.67
06/11/2002	13:40:40	83.92	3.89	15.531	48.5	197 1	1.66
06/11/2002	13:41:40	76.99	3.885	15.53	48.61	169.7	1.69
06/11/2002	13:42:40	79.98	3.902	15.504	48.33	177.8	1 71
06/11/2002	13:43:40	80.14	3.877	15.52	48.7	137.6	1.69
	Average	82.8	3.9	15.5	45.1	193.4	1.6

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 25% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 2

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/11/2002	14:20:14	85.17	3.845	15.576	41.99	179.2	1.67
06/11/2002	14:21:14	86.13	3.885	15.557	43.06	185.9	1.66
06/11/2002	14:22:14	86.74	3.868	15.543	43.19	186.9	1.63
06/11/2002	14:23:14	86	3.883	15.542	43.61	187.2	1.63
06/11/2002	14:24:14	85.51	3.88	15.532	43.43	188.1	1.62
06/11/2002	14:25:14	86.98	3.895	15.537	43.3	187.2	1.6
06/11/2002	14:26:14	86.3	3.865	15.54	43.56	187 1	1.58
06/11/2002	14:27:14	86.09	3.884	15.541	43.24	187 1	1.59
06/11/2002	14:28:14	87.32	3.871	15.639	43.06	186.8	1.57
06/11/2002	14:29:14	86.47	3.879	15.529	42.88	186.4	1.55
06/11/2002	14:30:14	84.85	3.89	15.531	42.6	186.1	1.52
06/11/2002	14:31:15	84.81	3.856	15.541	42.8	186.1	1.5
06/11/2002	14:32:15	85.74	3.884	15.537	42.47	186.1	1.5
06/11/2002	14:33:15	85.35	3.872	15.534	42.21	186.1	1.5
06/11/2002	14:34:13	84.75	3.866	15.534	42.44	186.3	1.5
06/11/2002	14:35:13	84.26	3.888	15.535	42.2	186.6	1.48
06/11/2002	14:36:13	83.92	3.847	15.556	42.06	185.2	1.47
06/11/2002	14:37:13	83.33	3.863	15.552	42.23	184.1	1.45
06/11/2002	14:38:13	83.97	3.873	15.534	42.06	185	1.46
06/11/2002	14:39:13	84.75	3.86	15.535	41.97	185.1	1.46
06/11/2002	14:40:13	85.1	3.888	15.53	42.29	184.6	1.46
06/11/2002	14:41:13	85.66	3.872	15.532	42.13	185.1	1.41
06/11/2002	14:42:13	85.68	3.833	15.603	38.56	185.9	1.45
06/11/2002	14:55:14	85.67	3.875	15.549	40.03	185.1	1.47
06/11/2002	14:56:14	84.42	3.851	15.552	39.11	188.4	1.43
06/11/2002	14:57:14	85.27	3.874	15.552	39.17	190	1.41
06/11/2002	14:58:14	84.32	3.859	15.546	39.51	189.8	1.41
06/11/2002	14:59:14	84.72	3.874	15.538	38.89	188.8	1.41
	Average	85.3	3.9	15.5	41.9	186.3	1.5

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 25% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 3

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/11/2002	15:35:52	91.42	3.881	15.527	41.28	183.1	1.55
06/11/2002	15:36:52	91	3.903	15.528	41.23	183.1	1.54
06/11/2002	15:37:52	90.23	3.886	15.53	41.29	183.4	1.49
06/11/2002	15:38:52	88.07	3.89	15.534	41 13	184.1	1.51
06/11/2002	15:39:52	88.88	3.899	15.525	40.84	184.1	1.5
06/11/2002	15:40:52	90.03	3.881	15.519	41.02	184.1	1.51
06/11/2002	15:41:52	90.99	3.908	15.518	40.79	183.7	1.49
06/11/2002	15:42:52	92.41	3.886	15.521	40.88	182.6	1.49
06/11/2002	15:43:52	89.4	3.888	15.53	40.61	183.1	1.45
06/11/2002	15:44:50	88.61	3.898	15.527	40.63	183.8	1.45
06/11/2002	15:45:50	88.28	3.886	15.512	40.47	183.2	1.42
06/11/2002	15:46:50	87.22	3.912	15.503	40.47	184.1	1.42
06/11/2002	15:47:50	87.81	3.895	15.514	40.34	184.1	1.42
06/11/2002	15:48:50	88.27	3.887	15.517	40.29	183.1	1.4
06/11/2002	15:49:50	89.49	3.906	15.514	40.46	183.1	1.43
06/11/2002	15:50:50	89.97	3.88	15.515	40.55	183	1.44
06/11/2002	15:51:50	89.09	3.903	15.515	40.58	182.9	1.44
06/11/2002	15:52:50	89.33	3.888	15.517	40.52	183.1	1.42
06/11/2002	15:53:50	89.21	3.889	15.513	40.2	182.9	1.4
06/11/2002	15:54:51	88.3	3.904	15.513	40.25	182.7	1.39
06/11/2002	15:55:51	87.69	3.871	15.526	40.08	183.1	1.39
06/11/2002	15:56:51	87.04	3.896	15.522	39.97	183.1	1.4
06/11/2002	15:57:51	88.39	3.877	15.521	40.11	182.4	1.39
06/11/2002	15:58:51	87 78	3.887	15.517	40.27	183.1	1.41
06/11/2002	15:59:51	87 18	3.895	15.516	40.22	183.1	1.36
06/11/2002	16:00:51	86.79	3.87	15.517	40.16	183.1	1.38
06/11/2002	16:01:51	85.17	3.893	15.527	38.61	183.5	1.35
06/11/2002	16:02:51	84	3.868	15.531	38.47	185	1.34
06/11/2002	16:03:51	86.15	3.883	15.519	38.37	184.5	1.35
06/11/2002	16:04:51	86.56	3.888	15.515	37.7	184.1	1.33
06/11/2002	16:05:51	85.31	3.872	15.52	37.07	183.3	1.33
06/11/2002	16:06:51	84.83	3.904	15.51	36.93	183.1	1.31
06/11/2002	16:07:51	84.48	3.882	15.502	37 18	183.5	1.3
06/11/2002	16:08:51	84.52	3.894	15.505	37.53	183.5	1.33
06/11/2002	16:09:51	85.37	3.891	15.503	37.37	183.1	1.3
06/11/2002	16:10:51	84.84	3.881	15.506	37.8	183.1	1.33
06/11/2002	16:11:51	84.86	3.908	15.501	38.16	182.3	1.33
06/11/2002	16:12:51	85.61	3.877	15.503	37.96	182.1	1.32
06/11/2002	16:13:52	83.3	3.898	15.501	38.18	182.7	1.28
06/11/2002	16:14:52	82.35	3.888	15.505	38.07	183.1	1.28
	Average	87.5	3.9	15.5	39.6	183.3	1.4

Data Summary

Run	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
Run 1	13:04-13:43	82.8	3.9	15.5	45.1	183.4	1.56
Run 2	14:20-14:59	85.3	3.9	15.5	41.9	186.3	1.51
Run 3	15:35-16:14	87.5	3.9	15.5	39.6	183.3	1.40

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 25% Load
Date:	06/11/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO
Molecular Weight:	28.01

Run No.	Start-Stop Time	Raw Data (ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
			Cma	Co	Cm	
1	13:04-13:43	82.8	59.4	0.2	58.0	84.91
2	14:20-14:59	85.3	59.4	0.2	57.8	87.87
3	15:35-16:14	87.5	59.4	0.2	57.8	90.09
					Average	87.62

Calibration Error Correction
Cgas=(Cobs-Co)*(Cma/(Cm-Co))
Mass Emission Rate (lb/hr)
E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000
Mass Emission Rate (lb/1000 lb fuel)
E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 25% Load
Date:	06/11/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	13:04-13:43	3.9	9.9	-0.2	9.9	3.96
2	14:20-14:59	3.9	9.9	-0.2	9.9	3.96
3	15:35-16:14	3.9	9.9	-0.2	9.9	4.01
					Average	3.98

<u>Calibration Error Correction</u>

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 25% Load
Date:	06/11/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	O2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	13:04-13:43	15.5	20.0	0.0	20.0	15.54
2	14:20-14:59	15.5	20.0	0.0	20.0	15.54
3	15:35-16:14	15.5	20.0	0.0	20.0	15.52
					Average	15.53

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Total Hydrocarbon Data Correction

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 25% Load
Date:	06/11/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	THC
Molecular Weight:	16.00

			Source Information		Corrected
Run No.	Start-Stop Time	Raw Data (ppm)	Stack Flow (dscfm)	Stack Moisture (%)	Data Dry Basis (ppm)
1	13:04-13:43	45.1	340.40	4.36	47.19
2	14:20-14:59	41.9	341.00	3.87	43.62
3	15:35-16:14	39.6	340.40	4.07	41.28
				Average	44.03

Moisture Correction

Cgas(dry)=Cgas(wet)/(1-(% moisture/100))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas(dry)*MWgas*Qs(dscfm)*60/385300000

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 25% Load
Date:	06/11/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	NOx
Molecular Weight:	46.01

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	13:04-13:43	193.4	448.0	0.6	436.5	198.10
2	14:20-14:59	186.3	448.0	0.1	435.0	191.83
3	15:35-16:14	183.3	448.0	-0.1	434.5	189.03
				Average		192.99

Calibration Error Correction
Cgas=(Cobs-Co)*(Cma/(Cm-Co))
Mass Emission Rate (lb/hr)
E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000
Mass Emission Rate (lb/1000 lb fuel)
E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

Date:	Run:	T-25-1			Horsepower:	39.57		
06/11/2002	Flow (dscfm):	340.4			Fuel Usage (gal/hr):	3.46		
	Moisture (%):	4.36						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	198.10	84.91	47.19	47.19	1.56	3.96	15.54
	Mass Rate (lb/hr)	0.48	0.13	0.04	3.98E-02	1.32E-03	0.01	0.03
	Mass Rate (lb/gal fuel)	0.14	0.04	0.01	0.01	0.00	0.00	0.01
	Mass Rate (gr/hp*hr)	5.54	1.45	0.44	0.46	0.02	0.11	0.30

Date:	Run:	T-25-2			Horsepower:	43.54		
06/11/2002	Flow (dscfm):	341			Fuel Usage (gal/hr):	3.81		
	Moisture (%):	3.87						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	191.83	87.87	43.62	43.62	1.51	3.96	15.54
	Mass Rate (lb/hr)	0.47	0.13	0.04	3.68E-02	1.28E-03	0.01	0.03
	Mass Rate (lb/gal fuel)	0.12	0.03	0.01	0.01	0.00	0.00	0.01
	Mass Rate (gr/hp*hr)	4.89	1.36	0.37	0.38	0.01	0.10	0.28

Date:	Run:	T-25-3			Horsepower:	42.82		
06/11/2002	Flow (dscfm):	340.4			Fuel Usage (gal/hr):	3.74		
	Moisture (%):	4.07						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	189.03	90.09	41.28	41.28	1.40	4.01	15.52
	Mass Rate (lb/hr)	0.46	0.13	0.03	3.48E-02	1.19E-03	0.01	0.03
	Mass Rate (lb/gal fuel)	0.12	0.04	0.01	0.01	0.00	0.00	0.01
	Mass Rate (gr/hp*hr)	4.89	1.42	0.36	0.37	0.01	0.10	0.28

Date:	Run:	T-2-25			Horsepower:	41.98		
06/13/2002	Flow (dscfm):	320.7			Fuel Usage (gal/hr):	3.67		
	Moisture (%):	4.1						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	223.68	141.72	85.59	86.52	0.93	3.96	15.53
	Mass Rate (lb/hr)	0.51	0.20	0.07	6.87E-02	7.43E-04	0.01	0.02
	Mass Rate (lb/gal fuel)	0.14	0.05	0.02	0.02	0.00	0.00	0.01
	Mass Rate (gr/hp*hr)	5.56	2.14	0.74	0.74	0.01	0.09	0.27

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	50% Load - Generator 1
Date	06/12/2002
Run Number	1
Start Time	0733
Stop Time	0813

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.6	0.3	0.6	0.0	0.6	0.0	0.0	Co=0.6
CO Low	~30	30.1									
CO Mid	~60	59.4				59.9	0.3	59.7	0.2	-0.1	Cm=59.8
CO High	80-100 (2)	149.4									
CO2 Zero	0	0		-0.1	-0.4	-0.2	-0.4	-0.2	-0.4	0.0	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9				10.1	0.8	10.1	0.8	0.0	Cm=10.1
CO2 High	80-100	20.5		20.5	0.0						
O2 Zero	0	0		0	0.0	0	0.0	0	0.0	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20				20.1	0.4	20.1	0.4	0.0	Cm=20.1
THC Zero	0	0		-0.5		0.5	0.3	3.5		1.0	
THC Low	25-35	49.6				49.8	0.1	51.2		0.5	
THC Mid	45-55	124.6				124.5	0.0				
THC High	80-90	298.6		299		299	0.0				
NOx Zero	0	0		0	0.0	0	0.0	1	0.1	0.1	Co=0.5
NOx Low	20-30 (3)										
NOx Mid	45-55	448				442	-0.6	442	-0.6	0.0	Cm=442.0
NOx High	80-90	885.5		880	-0.6						

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	50% Load - Generator 1
Date	06/12/02
Run Number	2
Start Time	0851
Stop Time	0931

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.6	0.3	0.6	0.0	0.6	0.0	0.0	Co=0.6
CO Low	~30	30.1									
CO Mid	~60	59.4				59.7	0.2	59.7	0.2	0.0	Cm=59.7
CO High	80-100 (2)	149.4									
CO2 Zero	0	0		-0.1	-0.4	-0.2	-0.4	-0.2	-0.4	0.0	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9				10.1	0.8	10.1	0.8	0.0	Cm=10.1
CO2 High	80-100	20.5		20.5	0.0						
O2 Zero	0	0		0	0.0	0	0.0	-0.1	-0.4	-0.4	-Co=0.1
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20				20.1	0.4	20.1	0.4	0.0	Cm=20.1
THC Zero	0	0		-0.5		3.5	1.3	4.6		0.4	
THC Low	25-35	49.6				51.2	0.5	50.4		-0.3	
THC Mid	45-55	124.6									
THC High	80-90	298.6		299							
NOx Zero	0	0		0	0.0	1	0.1	1	0.1	0.0	Co=1.0
NOx Low	20-30 (3)										
NOx Mid	45-55	448				442	-0.6	442	-0.6	0.0	Cm=442.0
NOx High	80-90	885.5		880	-0.6						

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	50% Load - Generator 1
Date	06/12/02
Run Number	3
Start Time	1005
Stop Time	1045

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.6	0.3	0.6	0.0	0.6	0.0	0.0	Co=0.6
CO Low	~30	30.1									
CO Mid	~60	59.4				59.7	0.2	59.6	0.1	-0.1	Cm=59.7
CO High	80-100 (2)	149.4									
CO2 Zero	0	0		-0.1	-0.4	-0.2	-0.4	-0.1	0.0	0.4	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9				10.1	0.8	10.1	0.8	0.0	Cm=10.1
CO2 High	80-100	20.5		20.5	0.0						
O2 Zero	0	0		0	0.0	-0.1	-0.4	-0.1	-0.4	0.0	-Co=0.1
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20				20.1	0.4	20.1	0.4	0.0	Cm=20.1
THC Zero	0	0		-0.5		4.6	1.7	4.8		0.1	
THC Low	25-35	49.6				50.4	0.3	50		-0.1	
THC Mid	45-55	124.6									
THC High	80-90	298.6		299							
NOx Zero	0	0		0	0.0	1	0.1	1	0.1	0.0	Co=1.0
NOx Low	20-30 (3)										
NOx Mid	45-55	448				442	-0.6	441	-0.7	-0.1	Cm=441.5
NOx High	80-90	885.5		880	-0.6						

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 50% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 1		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/12/2002	7:33:48	84.75	4.944	14.154	34.72	225	0.3
06/12/2002	7:34:49	85.35	4.951	14.163	35.04	226.2	0.28
06/12/2002	7:35:49	85.16	4.929	14.172	35.62	227.1	0.3
06/12/2002	7:36:49	83.95	4.952	14.179	36.32	228.2	0.29
06/12/2002	7:37:49	84.37	4.924	14.182	36.75	228.5	0.32
06/12/2002	7:38:49	84.19	4.937	14.186	37.27	229.2	0.33
06/12/2002	7:39:47	85.02	4.941	14.185	37.61	229.7	0.34
06/12/2002	7:40:47	84.9	4.922	14.178	37.64	230.2	0.32
06/12/2002	7:41:47	83.86	4.95	14.178	38.07	230.7	0.33
06/12/2002	7:42:47	83.7	4.932	14.183	38.65	231.5	0.32
06/12/2002	7:43:47	84.83	4.938	14.176	38.71	232	0.34
06/12/2002	7:44:47	84.71	4.949	14.173	39.09	231.5	0.33
06/12/2002	7:45:47	85.51	4.93	14.17	39.71	231.4	0.32
06/12/2002	7:46:47	85.6	4.96	14.166	39.48	232.2	0.34
06/12/2002	7:47:47	84.44	4.936	14.168	39.74	233.2	0.3
06/12/2002	7:48:47	84.01	4.949	14.168	40.65	233.8	0.34
06/12/2002	7:49:47	86.37	4.965	14.147	40.7	233.2	0.33
06/12/2002	7:50:47	86.01	4.951	14.149	40.31	233.7	0.34
06/12/2002	7:51:47	85.84	4.974	14.151	40.5	235	0.31
06/12/2002	7:52:47	85.68	4.808	14.36	39.81	234.9	0.34
06/12/2002	7:53:47	82.01	4.836	14.355	40.29	224.3	0.35
06/12/2002	7:54:47	83.78	4.857	14.312	40.61	224.8	0.34
06/12/2002	7:55:48	82.68	4.857	14.312	40.98	226.2	0.34
06/12/2002	7:56:48	83.85	4.877	14.301	41.54	226.2	0.34
06/12/2002	7:57:48	83.8	4.85	14.303	41.44	226.4	0.33
06/12/2002	7:58:48	83.77	4.881	14.288	41.44	227.2	0.32
06/12/2002	7:59:48	82.98	4.863	14.295	41.52	228	0.31
06/12/2002	8:00:48	83.53	4.871	14.29	46.23	228.2	0.49
06/12/2002	8:01:48	83.7	4.886	14.28	43.64	227.3	0.36
06/12/2002	8:02:48	85.16	4.871	14.276	44.5	227.2	0.38
06/12/2002	8:03:48	84.7	4.889	14.283	44.61	227.9	0.4
06/12/2002	8:04:48	84.7	4.866	14.282	43.96	229.2	0.37
06/12/2002	8:05:48	84.51	4.884	14.278	43.66	229.2	0.39
06/12/2002	8:06:48	85.05	4.886	14.27	44.42	229.1	0.36
06/12/2002	8:07:48	86.13	4.875	14.274	44.32	228	0.39
06/12/2002	8:08:48	86.83	4.901	14.264	43.94	228.1	0.39
06/12/2002	8:09:48	85.85	4.869	14.271	43.71	228.2	0.36
06/12/2002	8:10:48	85.97	4.806	14.39	43.68	227.9	0.37
06/12/2002	8:11:48	85.56	4.851	14.312	44.38	222.6	0.35
06/12/2002	8:12:48	88.13	4.889	14.261	44.85	226.1	0.39
	Average	84.8	4.9	14.2	40.8	229.0	0.3

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 50% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 2		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/12/2002	8:51:35	90.79	4.934	14.184	43.86	233.2	0.32
06/12/2002	8:52:35	90.98	4.92	14.199	44.74	232.4	0.36
06/12/2002	8:53:35	89.47	4.942	14.197	44.19	232.2	0.33
06/12/2002	8:54:35	89.99	4.916	14.193	44.16	232.1	0.32
06/12/2002	8:55:35	90.47	4.953	14.173	44.36	232.1	0.33
06/12/2002	8:56:36	90.9	4.937	14.173	44.7	232.5	0.32
06/12/2002	8:57:33	90.12	4.927	14.177	44.58	233.2	0.31
06/12/2002	8:58:33	90.12	4.956	14.167	44.3	233.2	0.31
06/12/2002	8:59:34	90.89	4.933	14.166	44.27	233.1	0.3
06/12/2002	9:00:34	90.93	4.944	14.164	45.9	232.8	0.29
06/12/2002	9:01:34	91.43	4.948	14.165	45.73	232.6	0.33
06/12/2002	9:02:34	91.73	4.932	14.173	45.38	232.3	0.33
06/12/2002	9:03:34	90.76	4.953	14.174	44.95	233.2	0.33
06/12/2002	9:04:34	90.33	4.922	14.176	45.41	232.6	0.3
06/12/2002	9:05:34	90.14	4.94	14.18	44.93	232.2	0.33
06/12/2002	9:06:34	90.66	4.941	14.165	44.75	232.5	0.3
06/12/2002	9:07:34	90.68	4.941	14.161	44.78	233.2	0.29
06/12/2002	9:08:34	91.51	4.957	14.157	44.66	233.2	0.32
06/12/2002	9:09:34	91.38	4.926	14.166	43.82	233.5	0.28
06/12/2002	9:10:34	88.36	4.948	14.163	41.39	235.1	0.25
06/12/2002	9:11:34	86.49	4.931	14.167	40.49	236.9	0.21
06/12/2002	9:12:34	87.23	4.938	14.17	40.14	236.9	0.24
06/12/2002	9:13:34	86.29	4.952	14.156	39.95	236.1	0.21
06/12/2002	9:14:34	87	4.935	14.152	40.42	235.9	0.23
06/12/2002	9:15:34	87.96	4.962	14.149	41.38	235.1	0.23
06/12/2002	9:16:34	87.86	4.929	14.161	40.96	235.6	0.24
06/12/2002	9:17:34	88.53	4.941	14.161	41.14	234.7	0.24
06/12/2002	9:18:35	88.44	4.943	14.157	41.14	234.1	0.25
06/12/2002	9:19:35	87.33	4.936	14.153	41.13	234.7	0.26
06/12/2002	9:20:35	87.91	4.96	14.146	40.83	234.4	0.22
06/12/2002	9:21:35	88.4	4.933	14.147	42.5	234.1	0.23
06/12/2002	9:22:35	89.17	4.958	14.143	43.54	234.1	0.23
06/12/2002	9:23:35	91.04	4.945	14.147	43.65	233.7	0.29
06/12/2002	9:24:35	91.57	4.942	14.148	43.21	233.2	0.3
06/12/2002	9:25:35	91.23	4.958	14.143	42.72	234.1	0.31
06/12/2002	9:26:35	90.24	4.938	14.143	42.52	234.1	0.27
06/12/2002	9:27:35	90.24	4.966	14.14	43.46	233.7	0.33
06/12/2002	9:28:35	90.08	4.942	14.145	43.16	233.9	0.31
06/12/2002	9:29:35	89.76	4.95	14.138	43.28	234.1	0.31
06/12/2002	9:30:35	89.57	4.959	14.135	43.29	234.4	0.31
	Average	89.7	4.9	14.2	43.2	233.8	0.3

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 50% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 3		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/12/2002	10:05:54	94.2	4.972	14.133	42.76	236.1	0.31
06/12/2002	10:06:54	91.99	4.965	14.139	41.55	237.7	0.29
06/12/2002	10:07:54	90.1	4.962	14.144	41.26	238.6	0.27
06/12/2002	10:08:54	89.12	4.976	14.139	40.79	238.7	0.24
06/12/2002	10:09:52	88.38	4.948	14.151	39.74	238.1	0.26
06/12/2002	10:10:52	88.68	4.972	14.132	39.47	237.6	0.22
06/12/2002	10:11:52	89.56	4.971	14.139	39.85	237.1	0.25
06/12/2002	10:12:52	90.82	4.956	14.138	39.88	237.1	0.24
06/12/2002	10:13:52	90.47	4.979	14.14	40.36	236.3	0.25
06/12/2002	10:14:52	91.11	4.963	14.121	40.18	235.5	0.25
06/12/2002	10:15:52	91.17	4.98	14.126	40.08	236.1	0.23
06/12/2002	10:16:52	91.25	4.974	14.125	40.05	236 1	0.26
06/12/2002	10:17:53	90.69	4.981	14.102	40.1	236.2	0.22
06/12/2002	10:18:53	90.71	4.999	14.104	40.39	237.4	0.25
06/12/2002	10:19:53	90.65	4.958	14.12	40.5	238.1	0.24
06/12/2002	10:20:53	91.18	4.981	14.122	42.52	237.7	0.24
06/12/2002	10:21:53	91.24	4.963	14.138	41 67	236 7	0.26
06/12/2002	10:22:53	91.1	4.965	14.14	41.46	236.1	0.28
06/12/2002	10:23:53	91.6	4.981	14.12	41.82	236.9	0.29
06/12/2002	10:24:53	92.9	4.957	14.127	42.34	237.1	0.31
06/12/2002	10:25:53	92 91	4.982	14.13	42.51	236.8	0.29
06/12/2002	10:26:53	92.86	4.968	14.119	42.57	237.1	0.29
06/12/2002	10:27:53	92.94	4.974	14.126	42.28	238	0.32
06/12/2002	10:28:53	93.45	4.974	14.121	42.31	237	0.31
06/12/2002	10:29:53	94.73	4.967	14.114	42.45	236.1	0.3
06/12/2002	10:30:53	96 17	4.99	14.109	42.76	235.6	0.27
06/12/2002	10:31:53	95.34	4.962	14.116	42.61	236.1	0.25
06/12/2002	10:32:53	95.53	4.966	14.125	42.32	236.1	0.29
06/12/2002	10:33:53	96.08	4.967	14.117	42.53	235.4	0.3
06/12/2002	10:34:53	95.93	4.987	14.108	43.04	235.8	0.29
06/12/2002	10:35:53	95.05	4.964	14.111	42.51	236 1	0.32
06/12/2002	10:36:54	94.02	4.987	14.119	43.01	236.6	0.27
06/12/2002	10:37:54	94.59	4.967	14.117	43.29	236.1	0.29
06/12/2002	10:38:54	94.73	4.921	14.197	42.82	236.1	0.3
06/12/2002	10:39:54	90 57	4.862	14.304	43.18	232.2	0.3
06/12/2002	10:40:54	89 78	4.839	14.319	42.93	229.9	0.31
06/12/2002	10:41:54	88.44	4.87	14.314	42.52	230.3	0.26
06/12/2002	10:42:54	89.3	4.849	14.304	42.19	231.2	0.28
06/12/2002	10:43:54	89.43	4.868	14.299	42.91	231.2	0.27
06/12/2002	10:44:54	89	4.853	14.309	43.22	231 9	0.29
	Average	91.9	5.0	14.2	41.8	235.9	0.3

Data Summary		CO	CO2	O2	THC	NOx	Methane
Run	Time	ppm	%	%	ppm	ppm	ppm
Run 1	07:33-08:12	84.8	4.9	14.2	40.8	229.0	0.34
Run 2	08:51-09:30	89.7	4.9	14.2	43.2	233.8	0.29
Run 3	10:05-10:44	91.9	5.0	14.2	41.8	235.9	0.27

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 50% Load
Date:	06/12/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO
Molecular Weight:	28.01

Run No.	Start-Stop Time	Raw Data (ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	07:33-08:12	84.8	59.4	0.6	59.8	84.46
2	08:51-09:30	89.7	59.4	0.6	59.7	89.55
3	10:05-10:44	91.9	59.4	0.6	59.7	91.89
					Average	88.63

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000

Mass Emission Rate (lb/1000 lb fuel)

E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 50% Load
Date:	06/12/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	07:33-08:12	4.9	9.9	-0.2	10.1	4.90
2	08:51-09:30	4.9	9.9	-0.2	10.1	4.94
3	10:05-10:44	5.0	9.9	-0.2	10.1	4.93
					Average	4.93

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 50% Load
Date:	06/12/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	O2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
			Cma	Co	Cm	
1	07:33-08:12	14.2	20.0	0.0	20.1	14.17
2	08:51-09:30	14.2	20.0	-0.1	20.1	14.11
3	10:05-10:44	14.2	20.0	-0.1	20.1	14.11
				Average		14.13

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Total Hydrocarbon Data Correction

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 50% Load
Date:	06/12/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	THC
Molecular Weight:	16.00

Run No.	Start-Stop Time	Raw Data (ppm)	Source Information Stack Flow (dscfm)	Source Information Stack Moisture (%)	Corrected Data Dry Basis (ppm)	Mass Emission Rate (lb/hr)	Mass Emission Rate (lb/1000 lb fuel)	Mass Emission Rate (gr/HP*hr)
1	07:33-08:12	40.8	337.10	4.68	42.75	0.04	0.0076	0.1792
2	08:51-09:30	43.2	332.10	5.39	45.71	0.04	0.0074	0.1887
3	10:05-10:44	41.8	333.90	4.68	43.82	0.04	0.0070	0.1819
				Average	44.09	0.04	0.0074	0.1832

Moisture Correction

Cgas(dry)=Cgas(wet)/(1-(% moisture/100))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas(dry)*MWgas*Qs(dscfm)*60/385300000

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 50% Load
Date:	06/12/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	N0x
Molecular Weight:	46.01

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data. Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	07:33-08:12	229.0	448.0	0.5	442.0	231.85
2	08:51-09:30	233.8	448.0	1.0	442.0	236.47
3	10:05-10:44	235.9	448.0	1.0	441.5	238.92
				Average		235.75

<u>Calibration Error Correction</u>
Cgas=(Cobs-Co)*(Cma/(Cm-Co))
<u>Mass Emission Rate (lb/hr)</u>
E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000
<u>Mass Emission Rate (lb/1000 lb fuel)</u>
E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

Date:	Run:	T-50-1			Horsepower:		77.57	
06/12/2002	**Flow (dscfm):**	337.1			**Fuel Usage (gal/hr):**		5.02	
	Moisture (%):	4.68						
	Pollutant:	**NOx**	**CO**	**NMHC**	**THC**	**Methane**	**CO2**	**O2**
	Concentration (ppm or %)	231.85	84.46	42 41	42.75	0.34	4 90	14.24
	Mass Rate (lb/hr)	0.56	0.12	0.04	3.57E-02	2.86E-04	0.01	0.02
	Mass Rate (lb/gal fuel)	0.11	0.02	0 01	0.01	0.00	0 00	0.00
	Mass Rate (gr/hp*hr)	3.28	0.73	0.21	0.21	0.00	0.07	0.14

Date:	Run:	T-50-2			Horsepower:		81.59	
06/12/2002	**Flow (dscfm):**	332.1			**Fuel Usage (gal/hr):**		5 28	
	Moisture (%):	5.39						
	Pollutant:	**NOx**	**CO**	**NMHC**	**THC**	**Methane**	**CO2**	**O2**
	Concentration (ppm or %)	236.47	89.55	45 42	45.71	0.29	4.94	14.16
	Mass Rate (lb/hr)	0.56	0.13	0.04	3.76E-02	2.40E-04	0.01	0 02
	Mass Rate (lb/gal fuel)	0 11	0.02	0.01	0 01	0.00	0.00	0.00
	Mass Rate (gr/hp*hr)	3.13	0.72	0.21	0.21	0.00	0.06	0.13

Date:	Run:	T-50-3			Horsepower:		75.76	
06/12/2002	**Flow (dscfm):**	333.9			**Fuel Usage (gal/hr):**		4.91	
	Moisture (%):	4.68						
	Pollutant:	**NOx**	**CO**	**NMHC**	**THC**	**Methane**	**CO2**	**O2**
	Concentration (ppm or %)	238 92	91.89	43.55	43.82	0.27	4.93	14.16
	Mass Rate (lb/hr)	0.57	0.13	0.04	3.62E-02	2.25E-04	0.01	0.02
	Mass Rate (lb/gal fuel)	0 12	0.03	0.01	0.01	0.00	0.00	0.00
	Mass Rate (gr/hp*hr)	3.43	0.80	0.22	0.22	0.00	0.07	0.14

Date:	Run:	T-2-50			Horsepower:		78.30	
06/13/2002	**Flow (dscfm):**	341.8			**Fuel Usage (gal/hr):**		5.07	
	Moisture (%):	4.7						
	Pollutant:	**NOx**	**CO**	**NMHC**	**THC**	**Methane**	**CO2**	**O2**
	Concentration (ppm or %)	264.30	141.00	69.35	69.84	0.49	5.33	13.61
	Mass Rate (lb/hr)	0 65	0.21	0.06	5.91E-02	4.17E-04	0.01	0.02
	Mass Rate (lb/gal fuel)	0.13	0.04	0.01	0 01	0.00	0.00	0.00
	Mass Rate (gr/hp*hr)	3.75	1.22	0.34	0.34	0.00	0.07	0.13

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	75% Load - Generator 1
Date	06/12/2002
Run Number	1
Start Time	1121
Stop Time	1201

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.6	0.3	0.6	0.0	0.6	0.0	0.0	Co=0.6
CO Low	~30	30.1									
CO Mid	~60	59.4				59.6	0.1	59.3	-0.1	-0.2	Cm=59.5
CO High	80-100 (2)	149.4									
CO2 Zero	0	0		-0.1	-0.4	-0.1	0.0	-0.2	-0.4	-0.4	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9				10.1	0.8	10.1	0.8	0.0	Cm=10.1
CO2 High	80-100	20.5		20.5	0.0						
O2 Zero	0	0		0	0.0	0	0.0	-0.1	-0.4	-0.4	-Co=0.1
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20				20.1	0.4	20	0.0	-0.4	Cm=20.1
THC Zero	0	0		-0.5		-0.5	0.0	4		1.5	
THC Low	25-35	49.6				50	0.1	50.9		0.3	
THC Mid	45-55	124.6									
THC High	80-90	298.6		299							
NOx Zero	0	0		0	0.0	1	0.1	1	0.1	0.0	Co=1.0
NOx Low	20-30 (3)										
NOx Mid	45-55	448				441	-0.7	438	-1.0	-0.3	Cm=439.5
NOx High	80-90	885.5		880	-0.6						

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	75% Load - Generator 1
Date	06/12/02
Run Number	2
Start Time	1238
Stop Time	1318

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.6	0.3	0.6	0.0	0.6	0.0	0.0	Co=0.6
CO Low	~30	30.1									
CO Mid	~60	59.4				59.3	-0.1	59.1	-0.1	-0.1	Cm=59.2
CO High	80-100 (2)	149.4									
CO2 Zero	0	0		-0.1	-0.4	-0.2	-0.4	-0.2	-0.4	0.0	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9				10.1	0.8	10.1	0.8	0.0	Cm=10.1
CO2 High	80-100	20.5		20.5	0.0						
O2 Zero	0	0		0	0.0	-0.1	-0.4	-0.1	-0.4	0.0	-Co=0.1
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20				20	0.0	20	0.0	0.0	Cm=20.0
THC Zero	0	0		-0.5		4	1.5	3.6		-0.1	
THC Low	25-35	49.6				50.9	0.4	49.5		-0.5	
THC Mid	45-55	124.6									
THC High	80-90	298.6		299							
NOx Zero	0	0		0	0.0	1	0.1	1	0.1	0.0	Co=1.0
NOx Low	20-30 (3)										
NOx Mid	45-55	448				438	-1.0	437	-1.1	-0.1	Cm=437.5
NOx High	80-90	885.5		880	-0.6						

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	75% Load - Generator 1
Date	06/12/02
Run Number	3
Start Time	1351
Stop Time	1431

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.6	0.3	0.6	0.0	0.4	-0.1	-0.1	Co=0.5
CO Low	~30	30.1									
CO Mid	~60	59.4				59.1	-0.1	58.7	-0.3	-0.2	Cm=58.9
CO High	80-100 (2)	149.4									
CO2 Zero	0	0		-0.1	-0.4	-0.2	-0.4	-0.2	-0.4	0.0	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9				10.1	0.8	10.1	0.8	0.0	Cm=10.1
CO2 High	80-100	20.5		20.5	0.0						
O2 Zero	0	0		0	0.0	-0.1	-0.4	-0.1	-0.4	0.0	-Co=0.1
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20				20	0.0	20	0.0	0.0	Cm=20.0
THC Zero	0	0		-0.5		3.6	1.4	4		0.1	
THC Low	25-35	49.6				49.5	0.0	50.5		0.3	
THC Mid	45-55	124.6									
THC High	80-90	298.6		299							
NOx Zero	0	0		0	0.0	1	0.1	1	0.1	0.0	Co=1.0
NOx Low	20-30 (3)										
NOx Mid	45-55	448				437	-1.1	436	-1.2	-0.1	Cm=436.5
NOx High	80-90	885.5		880	-0.6						

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 75% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 1

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/12/2002	11:21:07	104.79	5.774	13.069	39.43	328 2	0.08
06/12/2002	11:22:07	106.11	5.771	13.082	38.75	328.2	0.1
06/12/2002	11:23:07	106 95	5.792	13.065	38.83	328.2	0.06
06/12/2002	11:24:07	108.34	5.785	13.061	39.19	328.7	0.07
06/12/2002	11:25:07	106.48	5.798	13.068	39.77	330.5	0.08
06/12/2002	11:26:07	107.41	5.771	13.065	39.45	330.4	0.08
06/12/2002	11:27:07	105.85	5.776	13.086	38.72	331.2	0.07
06/12/2002	11:28:07	106.01	5.78	13.069	38.86	330.9	0.05
06/12/2002	11:29:07	107.35	5.792	13 054	39.46	331.3	0.06
06/12/2002	11:30:07	108.43	5.803	13.053	39.51	332.4	0.06
06/12/2002	11:31:07	107.58	5.813	13.014	40.14	333.2	0.07
06/12/2002	11:32:08	114.99	5.994	12.81	40.62	336 5	0 06
06/12/2002	11:33:08	121.66	6.007	12.763	40 63	340.4	0.07
06/12/2002	11:34:08	123.23	6.001	12.769	40.21	340.6	0.06
06/12/2002	11:35:08	123.23	6.022	12.742	41.2	340.6	0.1
06/12/2002	11:36:08	123.37	6.016	12.777	41.08	342.7	0.09
06/12/2002	11:37:08	121.54	5.986	12.782	40.92	341.2	0.1
06/12/2002	11:38:08	121.99	6.017	12.768	41.25	340.2	0.09
06/12/2002	11:39:08	122.86	6.015	12.762	41	341.2	0.07
06/12/2002	11:40:08	122.34	5.876	12.929	41.21	340.3	0.05
06/12/2002	11:41:08	112.73	5.968	12.841	41.68	334.7	0.07
06/12/2002	11:42:08	120.7	5.999	12.76	42.01	338.4	0.12
06/12/2002	11:43:08	120.29	6.036	12.747	41.45	340.3	0.11
06/12/2002	11:44:08	119 82	6.011	12 756	40.68	341.6	0.09
06/12/2002	11:45:08	119.17	6.02	12.749	40.2	341 5	0 06
06/12/2002	11:46:08	117.67	6.013	12.762	40.37	342.7	0.08
06/12/2002	11:47:08	117.97	5.991	12.78	40.56	342.2	0.09
06/12/2002	11:48:08	117.63	6.006	12.75	40.37	340.9	0.08
06/12/2002	11:49:09	117.34	6 018	12 749	40.07	342.3	0.06
06/12/2002	11:50:09	116.97	6.002	12.761	40.49	343.8	0.08
06/12/2002	11:51:09	114.92	5.987	12.77	40.59	343.4	0.09
06/12/2002	11:52:09	115.09	6.011	12.765	40.65	343.2	0.09
06/12/2002	11:53:09	114.86	6.01	12.737	38.08	343.8	0.04
06/12/2002	11:54:09	112.83	6.016	12.75	37.38	344.1	0.01
06/12/2002	11:55:09	110.91	6.005	12.748	36.44	343.2	0
06/12/2002	11:56:07	111.36	6.001	12.737	36.56	342.9	0.02
06/12/2002	11:57:07	111.48	6.019	12.749	36.25	342.6	0 04
06/12/2002	11:58:07	109.87	5.986	12.761	35.81	341.6	-0.01
06/12/2002	11:59:07	110.31	6	12.763	35.86	340.6	-0.02
06/12/2002	12:00:07	112.08	6.013	12.738	36.51	340.6	-0.02
	Average	114.4	5.9	12.8	39.6	338.3	0.1

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 75% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 2

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/12/2002	12:38:35	113.23	6.014	12.693	35.26	342.6	-0.1
06/12/2002	12:39:35	115 72	6.089	12.661	35.28	341.3	-0.09
06/12/2002	12:40:35	116.84	6.067	12.654	36.04	342.2	-0.07
06/12/2002	12:41:35	116.18	6.042	12.712	36.15	343.5	-0.11
06/12/2002	12:42:35	115.7	6.036	12.717	36.14	342.6	-0.05
06/12/2002	12:43:35	113.71	6 004	12 745	36.43	340 9	-0 05
06/12/2002	12:44:36	114.93	6.061	12 704	36.51	339.4	-0.06
06/12/2002	12:45:36	114.91	6.022	12.716	36.43	341	-0 06
06/12/2002	12:46:36	113.21	6.04	12.722	36.54	341.8	-0.09
06/12/2002	12:47:36	112.98	6.027	12.72	36.3	341.2	-0.08
06/12/2002	12:48:36	114.04	6.023	12.721	36.08	342.1	-0.1
06/12/2002	12:49:36	114.48	6.044	12.718	35.77	341.7	-0.11
06/12/2002	12:50:36	114.97	6.029	12.693	35 87	340.8	-0.11
06/12/2002	12:51:36	114.56	6.057	12.711	36.16	341.1	-0.08
06/12/2002	12:52:36	114.47	6.047	12.68	36.37	340.7	-0.09
06/12/2002	12:53:36	117 06	6.063	12.671	35.87	342.2	-0.08
06/12/2002	12:54:36	114.32	6.051	12.689	35.72	343.2	-0.11
06/12/2002	12:55:36	112.94	6 022	12.718	36.13	342.4	-0 09
06/12/2002	12:56:36	112 77	6.032	12.733	36.48	341.4	-0.09
06/12/2002	12:57:36	112.63	6.034	12.695	36 84	341.3	-0.07
06/12/2002	12:58:36	113.41	6.048	12.696	37.66	343	-0.08
06/12/2002	12:59:36	114.53	6.059	12.673	37 48	343.4	-0.04
06/12/2002	13:00:36	114.67	6.035	12.692	37.51	344.2	-0.04
06/12/2002	13:01:36	115.7	6.06	12.689	37.38	344.2	-0.05
06/12/2002	13:02:36	117.16	6.04	12.681	37 28	343.2	-0.04
06/12/2002	13:03:36	116.06	6 052	12.69	37.09	343.2	-0.06
06/12/2002	13:04:37	115.39	6.031	12.701	36.41	343.2	-0.06
06/12/2002	13:05:37	114.12	6.046	12.681	36.6	344.2	-0.07
06/12/2002	13:06:37	115.13	6.066	12 669	36.83	344.4	-0.06
06/12/2002	13:07:37	115.48	6.047	12.667	36.82	345	-0.08
06/12/2002	13:08:37	117.27	6.062	12.678	36 57	344.4	-0.04
06/12/2002	13:09:35	119.45	6.031	12.697	35.71	342.7	-0.07
06/12/2002	13:10:35	120.31	6.036	12.679	35.76	340.4	-0.1
06/12/2002	13:11:35	121.2	6.072	12.66	35.9	341.1	-0.06
06/12/2002	13:12:35	121.95	6.058	12 642	35.83	342.5	-0.1
06/12/2002	13:13:35	122.57	6.073	12.649	36.68	344.5	-0.05
06/12/2002	13:14:35	120.67	6.058	12.655	36.55	345.2	-0.06
06/12/2002	13:15:35	119	6.054	12.653	35.97	345.8	-0.05
06/12/2002	13:16:35	118.54	6.062	12.663	36.03	346.2	-0.09
06/12/2002	13:17:35	119	6.046	12.649	35.8	346.2	-0.07
	Average	116.0	6.0	12.7	36.4	342.8	-0.1

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 75% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 3

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/12/2002	13:51:30	124.26	6 149	12.534	36.58	350.7	-0.08
06/12/2002	13:52:30	124.75	6.166	12.552	36 31	349.2	-0.09
06/12/2002	13:53:30	125.04	6 127	12.569	36.43	349 1	-0 05
06/12/2002	13:54:30	123.83	6 116	12.595	36.29	349.2	-0.09
06/12/2002	13:55:30	118.34	6 041	12.695	36.98	347 5	-0 08
06/12/2002	13:56:31	122.29	6 113	12.585	37.19	347.2	-0.08
06/12/2002	13:57:31	121.78	6.121	12.605	37.03	350.5	-0.06
06/12/2002	13:58:31	122.18	6.084	12.616	37.34	349.8	-0.06
06/12/2002	13:59:31	122.37	6.124	12.592	37.25	348 3	-0.07
06/12/2002	14:00:31	122.71	6.088	12.622	37.56	350.6	-0.1
06/12/2002	14:01:31	122 47	6.08	12.631	37.5	349.7	-0.09
06/12/2002	14:02:31	119.77	6.081	12.648	37 04	348.9	-0.1
06/12/2002	14:03:31	118.89	6.072	12.629	37.23	348.3	-0.08
06/12/2002	14:04:31	119.21	6.1	12.625	35.87	349.1	-0.1
06/12/2002	14:05:31	120.5	6.096	12.605	33.72	349 1	-0.14
06/12/2002	14:06:31	119.15	6.1	12.608	32 67	348.2	-0.14
06/12/2002	14:07:31	117.19	6.046	12.679	32.24	347.6	-0.15
06/12/2002	14:08:31	114.72	6.091	12.6	32	346.1	-0.16
06/12/2002	14:09:31	118.2	6 116	12.609	32.12	348 4	-0.15
06/12/2002	14:10:31	118.69	6.095	12.601	32.33	347.7	-0.17
06/12/2002	14:11:31	119.57	6.094	12.617	32.59	346 9	-0.15
06/12/2002	14:12:31	118.34	6.095	12.611	32 87	346.2	-0 16
06/12/2002	14:13:31	118.18	6.08	12.62	33.37	347.1	-0.12
06/12/2002	14:14:31	117.07	6.106	12.618	33.6	346.2	-0.13
06/12/2002	14:15:31	120 17	6.098	12 594	33.9	347	-0.12
06/12/2002	14:16:32	121.88	6.101	12.615	34.29	348	-0.1
06/12/2002	14:17:32	119.32	6.085	12.62	34.1	347.9	-0.1
06/12/2002	14:18:32	121.4	6.084	12.622	34.28	346.1	-0.1
06/12/2002	14:19:32	124.4	6.118	12.593	34.74	344.7	-0 1
06/12/2002	14:20:32	125 09	6 078	12 609	35.18	346.4	-0.1
06/12/2002	14:21:32	123.98	6.093	12.625	35.84	346.9	-0.06
06/12/2002	14:22:32	123.11	6.085	12.617	35.31	344.8	-0.09
06/12/2002	14:23:32	122.72	6.075	12.634	35 35	345	-0.12
06/12/2002	14:24:32	121 08	6.071	12.649	35.35	344.7	-0.11
06/12/2002	14:25:30	121.71	6.071	12.63	35.19	343.7	-0.1
06/12/2002	14:26:30	122.03	6.076	12.638	35.18	345 1	-0.11
06/12/2002	14:27:30	122.48	6 083	12.621	35.05	344.4	-0.12
06/12/2002	14:28:30	124.14	6.089	12.605	35 47	344.9	-0.1
06/12/2002	14:29:30	122 68	6.101	12 613	35.48	346.3	-0.11
06/12/2002	14:30:30	122.62	6.07	12.612	35.3	346.2	-0.11
	Average	121.2	6.1	12.6	35.1	347.3	-0.1

Data Summary

Run	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
Run 1	11:21-12:00	114.4	5.9	12.8	39.6	338.3	0.1
Run 2	12:38-13:17	116.0	6.0	12.7	36.4	342.8	-0.1
Run 3	13:51-14:30	121.2	6.1	12.6	35.1	347.3	-0.1

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 75% Load
Date:	06/12/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO
Molecular Weight:	28.01

Run No.	Start-Stop Time	Raw Data (ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	11:21-12:00	114.4	59.4	0.6	59.5	114.83
2	12:38-13:17	116.0	59.4	0.6	59.2	117.01
3	13:51-14:30	121.2	59.4	0.5	58.9	122.77
					Average	118.20

<u>Calibration Error Correction</u>
Cgas=(Cobs-Co)*(Cma/(Cm-Co))
<u>Mass Emission Rate (lb/hr)</u>
E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000
<u>Mass Emission Rate (lb/1000 lb fuel)</u>
E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 75% Load
Date:	06/12/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO_2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	11:21-12:00	5.9	9.9	-0.2	10.1	5.88
2	12:38-13:17	6.0	9.9	-0.2	10.1	6.00
3	13:51-14:30	6.1	9.9	-0.2	10.1	6.05
					Average	5.98

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 75% Load
Date:	06/12/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	O2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	11:21-12:00	12.8	20.0	-0.1	20.1	12.83
2	12:38-13:17	12.7	20.0	-0.1	20.0	12.72
3	13:51-14:30	12.6	20.0	-0.1	20.0	12.65
					Average	12.74

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Total Hydrocarbon Data Correction

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 75% Load
Date:	06/12/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	THC
Molecular Weight:	16.00

			Source Information		Corrected
Run No.	Start-Stop Time	Raw Data (ppm)	Stack Flow (dscfm)	Stack Moisture (%)	Data Dry Basis (ppm)
1	11:21-12:00	39.6	359.20	5.92	42.05
2	12:38-13:17	36.4	359.60	5.30	38.39
3	13:51-14:30	35.1	354.30	6.47	37.53
				Average	39.32

Moisture Correction

Cgas(dry)=Cgas(wet)/(1-(% moisture/100))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas(dry)*MWgas*Qs(dscfm)*60/385300000

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 75% Load
Date:	06/12/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	N0x
Molecular Weight:	46.01

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	11:21-12:00	338.3	448.0	1.0	439.5	344.59
2	12:38-13:17	342.8	448.0	1.0	437.5	350.76
3	13:51-14:30	347.3	448.0	1.0	436.5	356.28
					Average	350.55

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000

Mass Emission Rate (lb/1000 lb fuel)

E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

Date:	Run:	T-75-1			Horsepower:		99.75	
06/12/2002	Flow (dscfm):	359.2			Fuel Usage (gal/hr):		5.65	
	Moisture (%):	5 92						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	344 59	114.83	42.05	42.05	0.10	5.88	12.83
	Mass Rate (lb/hr)	0.89	0.18	0 04	3.74E-02	8.95E-05	0.01	0.02
	Mass Rate (lb/gal fuel)	0.16	0.03	0.01	0.01	0.00	0.00	0.00
	Mass Rate (gr/hp*hr)	4.04	0.82	0.17	0.17	0.00	0.07	0.10

Date:	Run:	T-75-2			Horsepower:		111.81	
06/12/2002	Flow (dscfm):	359.6			Fuel Usage (gal/hr):		6.33	
	Moisture (%):	5.3						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	350 76	117.01	38.39	38.39	0.00	6.00	12 72
	Mass Rate (lb/hr)	0.90	0.18	0.03	3.42E-02	0.00E+00	0 01	0.02
	Mass Rate (lb/gal fuel)	0.14	0.03	0.01	0 01	0.00	0.00	0.00
	Mass Rate (gr/hp*hr)	3.67	0.74	0.14	0.14	0.00	0.06	0.09

Date:	Run:	T-75-3			Horsepower:		107.38	
06/12/2002	Flow (dscfm):	354.3			Fuel Usage (gal/hr):		6.08	
	Moisture (%):	6.47						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	356.28	122.77	37.53	37.53	0.00	6.05	12.65
	Mass Rate (lb/hr)	0.90	0.19	0 03	3.29E-02	0.00E+00	0.01	0.02
	Mass Rate (lb/gal fuel)	0.15	0.03	0 01	0 01	0 00	0.00	0.00
	Mass Rate (gr/hp*hr)	3.82	0.80	0.14	0.14	0.00	0.06	0.09

Date:	Run:	T-2-75			Horsepower:		106.31	
06/13/2002	Flow (dscfm):	358.2			Fuel Usage (gal/hr):		6.02	
	Moisture (%):	5.9						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	341.43	147.24	59.38	59.58	0.20	6.00	12.70
	Mass Rate (lb/hr)	0.88	0.23	0.05	5.28E-02	1.78E-04	0.01	0.02
	Mass Rate (lb/gal fuel)	0.15	0.04	0.01	0.01	0.00	0.00	0.00
	Mass Rate (gr/hp*hr)	3.74	0.98	0.22	0.23	0.00	0.06	0.10

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	100% Load - Generator 1
Date	06/13/2002
Run Number	1
Start Time	0731
Stop Time	0811

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	SYSTEM CAL CHECK PRETEST System Response	PRETEST Syst. Bias (% of Span)	POST TEST System Response	POST TEST Syst. Bias (% of Span)	Drift (% of Span)	Calibration Correction Factors
CO Zero	0	0		0.6	0.3	0.6	0.0	0.8	0.1	0.1	Co=0.7
CO Low	~30	30.1									
CO Mid	~60	59.4									
CO High	80-100 (2)	149.4		152	1.3	152	0.0	152	0.0	0.0	Cm=152.0
CO2 Zero	0	0		-0.2	-0.8	-0.1	0.4	0.1	1.2	0.8	Co=0.0
CO2 Low	NR										
CO2 Mid	40-60	9.9									
CO2 High	80-100	20.5		20.7	0.8	20.6	-0.4	20.6	-0.4	0.0	Cm=20.6
O2 Zero	0	0		0	0.0	0	0.0	0	0.0	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.7	0.8	10.6	-0.4	10.6	-0.4	0.0	Cm=10.6
O2 High	80-100	20									
THC Zero	0	0		0		0.6	0.2	4.2		1.2	
THC Low	25-35	49.6				48	-0.5	48.9		0.3	
THC Mid	45-55	124.6				122	-0.9				
THC High	80-90	298.6		295		290	-1.7				
NOx Zero	0	0		-1	-0.1	0	0.1	2	0.3	0.2	Co=1.0
NOx Low	20-30 (3)										
NOx Mid	45-55	448				442	-0.6	443	-0.5	0.1	Cm=442.5
NOx High	80-90	885.5		881	-0.5						

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	100% Load - Generator 1
Date	06/13/02
Run Number	2
Start Time	0845
Stop Time	0925

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.6	0.3	0.8	-0.1	0.8	0.1	0.0	Co=0.8
CO Low	~30	30.1									
CO Mid	~60	59.4									
CO High	80-100 (2)	149.4		152	1.3	152	0.0	152	0.0	0.0	Cm=152.0
CO2 Zero	0	0		-0.2	-0.8	0.1	1.2	-0.1	0.4	-0.8	Co=0.0
CO2 Low	NR										
CO2 Mid	40-60	9.9									
CO2 High	80-100	20.5		20.7	0.8	20.6	-0.4	20.6	-0.4	0.0	Cm=20.6
O2 Zero	0	0		0	0.0	0	0.0	0	0.0	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.7	0.8	10.6	-0.4	10.6	-0.4	0.0	Cm=10.6
O2 High	80-100	20									
THC Zero	0	0		0		4.2	1.4	3.5		-0.2	
THC Low	25-35	49.6				48.9	-0.2	46.9		-0.7	
THC Mid	45-55	124.6									
THC High	80-90	298.6		295							
NOx Zero	0	0		-1	-0.1	2	0.3	3.1	0.4	0.1	Co=2.6
NOx Low	20-30 (3)										
NOx Mid	45-55	448				443	-0.5	442	-0.6	-0.1	Cm=442.5
NOx High	80-90	885.5		881	-0.5						

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	100% Load - Generator 1
Date	06/13/02
Run Number	3
Start Time	1000
Stop Time	1040

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.6	0.3	0.8	-0.1	0.8	0.1	0.0	Co=0.8
CO Low	~30	30.1									
CO Mid	~60	59.4									
CO High	80-100 (2)	149.4		152	1.3	152	0.0	151	-0.5	-0.5	Cm=151.5
CO2 Zero	0	0		-0.2	-0.8	-0.1	0.4	0.1	1.2	0.8	Co=0.0
CO2 Low	NR										
CO2 Mid	40-60	9.9									
CO2 High	80-100	20.5		20.7	0.8	20.6	-0.4	20.5	-0.8	-0.4	Cm=20.6
O2 Zero	0	0		0	0.0	0	0.0	0	0.0	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.7	0.8	10.6	-0.4	10.6	-0.4	0.0	Cm=10.6
O2 High	80-100	20									
THC Zero	0	0		0		3.5	1.2	4.3		0.3	
THC Low	25-35	49.6				46.9	-0.9	47.7		0.3	
THC Mid	45-55	124.6									
THC High	80-90	298.6		295							
NOx Zero	0	0		-1	-0.1	3.1	0.4	4	0.5	0.1	Co=3.6
NOx Low	20-30 (3)										
NOx Mid	45-55	448									
NOx High	80-90	885.5		881	-0.5	442	-0.6	441	-0.7	-0.1	Cm=441.5

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 100% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 1

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/13/2002	7:31:55	128 24	6.875	11.676	31.43	438.2	-0.26
06/13/2002	7:32:55	127.78	6.844	11.77	31.33	443.5	-0.21
06/13/2002	7:33:55	121.72	6.767	11.83	31.27	436.4	-0.25
06/13/2002	7:34:55	128.29	6.859	11.716	31.31	441	-0.25
06/13/2002	7:35:55	128.16	6.874	11.72	31.51	452.8	-0.22
06/13/2002	7:36:55	132.59	6.887	11.677	32.02	455.7	-0.2
06/13/2002	7:37:55	135.12	6.916	11.662	32.24	459.6	-0.21
06/13/2002	7:38:55	133.5	6.882	11.67	32.33	463.6	-0.21
06/13/2002	7:39:55	134.32	6.889	11.695	31.86	465.8	-0.2
06/13/2002	7:40:55	132.48	6.87	11.717	32.15	466.5	-0.21
06/13/2002	7:41:55	134.74	6.879	11.692	32.09	466.8	-0.22
06/13/2002	7:42:55	136.47	6.892	11.696	32.01	467.2	-0.21
06/13/2002	7:43:55	134.56	6 864	11.702	32.23	468.4	-0.2
06/13/2002	7:44:55	135.21	6.903	11.681	32.08	468.9	-0.2
06/13/2002	7:45:55	137.15	6.886	11.68	31.76	469.8	-0.21
06/13/2002	7:46:56	138.06	6.892	11.675	31.82	470.5	-0.22
06/13/2002	7:47:53	136 46	6 906	11.669	31.14	471.9	-0.23
06/13/2002	7:48:53	136.52	6.883	11.67	30.67	474	-0.24
06/13/2002	7:49:54	137.35	6.913	11.658	30.54	474.9	-0.22
06/13/2002	7:50:54	138.77	6.918	11.638	30.18	475.5	-0.23
06/13/2002	7:51:54	140.88	6.911	11.633	29.84	477.3	-0.26
06/13/2002	7:52:54	140.22	6.927	11.64	29.79	479.1	-0.26
06/13/2002	7:53:54	140.86	6.912	11.624	29 95	479.1	-0 23
06/13/2002	7:54:54	140.69	6.925	11.648	29.99	481.6	-0.25
06/13/2002	7:55:54	140 12	6.93	11.62	29.9	482 5	-0.25
06/13/2002	7:56:54	142.07	6.931	11.628	29.65	482.5	-0.23
06/13/2002	7:57:54	142.2	6.95	11.614	29.44	483.5	-0.26
06/13/2002	7:58:54	143 74	6.922	11.617	29.58	485.1	-0.25
06/13/2002	7:59:54	142.71	6.939	11.627	30.1	485.5	-0.26
06/13/2002	8:00:54	138.95	6 785	11.812	30.19	484.9	-0.3
06/13/2002	8:01:54	129.3	6.948	11.592	30.17	481 4	-0.27
06/13/2002	8:02:54	141.65	6.945	11.6	29.5	485.1	-0.35
06/13/2002	8:03:54	139.34	6.924	11.608	28.63	485	-0.32
06/13/2002	8:04:54	138 35	6.937	11.624	28.96	483 8	-0.33
06/13/2002	8:05:54	139.25	6.914	11.608	28.9	482.5	-0.26
06/13/2002	8:06:54	139.67	6.924	11.627	28.97	483.3	-0.28
06/13/2002	8:07:54	139.41	6.93	11.609	29.08	483.4	-0.29
06/13/2002	8:08:54	140.2	6.931	11.6	29.29	484	-0.27
06/13/2002	8:09:55	141.8	6.94	11.607	29.53	485 5	-0.28
06/13/2002	8:10:55	142.78	6.92	11.595	29.64	484.7	-0.27
	Average	136.8	6.9	11.7	30.6	472.3	-0.2

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 100% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 2

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/13/2002	8:45:47	155.04	7.016	11.466	26.75	481.5	-0.26
06/13/2002	8:46:47	159.52	7.062	11.412	28.26	488.2	-0.26
06/13/2002	8:47:47	160.86	7.038	11.429	28.35	493.5	-0.22
06/13/2002	8:48:47	160.17	7.072	11.422	29	495.6	-0.22
06/13/2002	8:49:47	159.48	7.031	11.439	28.93	497.2	-0.2
06/13/2002	8:50:47	160.9	7.071	11.406	28.69	498.8	-0.2
06/13/2002	8:51:47	162.57	7.074	11.398	28.74	499.9	-0.18
06/13/2002	8:52:47	164.14	7.045	11.429	28.48	500.1	-0.23
06/13/2002	8:53:47	161.49	7.067	11.422	28.58	501	-0.23
06/13/2002	8:54:47	163.85	7.044	11.416	28.51	500.9	-0.23
06/13/2002	8:55:47	163.08	7.073	11.417	28.45	500.4	-0.25
06/13/2002	8:56:47	164.71	7.076	11.398	28.5	500.4	-0.23
06/13/2002	8:57:47	162.99	7.048	11.428	28.28	500.4	-0.25
06/13/2002	8:58:47	162.78	7.049	11.44	27.95	500.4	-0.27
06/13/2002	8:59:47	162.17	7.018	11.449	27.76	499.1	-0.29
06/13/2002	9:00:47	161.35	7.054	11.444	27.62	497.2	-0.3
06/13/2002	9:01:47	162.15	7.03	11.44	27.62	497.3	-0.31
06/13/2002	9:02:47	164.37	7.058	11.425	27.65	497.1	-0.27
06/13/2002	9:03:45	162.73	7.042	11.45	27.44	498.1	-0.3
06/13/2002	9:04:45	160.03	7.02	11.452	27.17	497.6	-0.27
06/13/2002	9:05:45	161.39	7.043	11.446	26.73	497.4	-0.27
06/13/2002	9:06:45	160.79	7.039	11.44	26.68	497.4	-0.27
06/13/2002	9:07:45	161.69	7.036	11.44	26.76	497.9	-0.28
06/13/2002	9:08:46	163.05	7.058	11.424	26.41	496.8	-0.29
06/13/2002	9:09:46	162.23	7.04	11.42	26.36	498.3	-0.29
06/13/2002	9:10:46	162.76	7.056	11.434	26.57	498.6	-0.3
06/13/2002	9:11:46	158.93	7.022	11.451	26.03	499.4	-0.29
06/13/2002	9:12:46	160.3	7.044	11.431	26	498.1	-0.32
06/13/2002	9:13:46	161.26	7.059	11.418	26.04	498.3	-0.33
06/13/2002	9:14:46	162.99	7.036	11.426	26.29	499	-0.3
06/13/2002	9:15:46	159.53	7.058	11.438	25.99	499.1	-0.33
06/13/2002	9:16:46	159.76	7.076	11.376	23.89	500.2	-0.34
06/13/2002	9:17:46	158.46	7.099	11.366	23.05	503.6	-0.35
06/13/2002	9:18:46	161.06	7.129	11.313	23.4	505.8	-0.36
06/13/2002	9:19:46	162.14	7.025	11.454	23.34	506.9	-0.33
06/13/2002	9:20:46	145.03	7.068	11.426	23.28	504	-0.33
06/13/2002	9:21:46	168.96	7.133	11.278	23.44	508.6	-0.36
06/13/2002	9:22:46	167.6	7.131	11.32	24.09	509.4	-0.33
06/13/2002	9:23:46	166.7	7.108	11.333	24.24	507	-0.36
06/13/2002	9:24:46	163.98	7.068	11.385	24.63	506	-0.33
	Average	161.6	7.1	11.4	26.6	499.4	-0.3

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 100% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 3

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/13/2002	10:00:12	164.5	7.111	11.353	23.91	510.6	-0.32
06/13/2002	10:01:12	162.25	7.102	11.332	24.12	510.9	-0.3
06/13/2002	10:02:12	163.74	7.104	11.358	24.7	512.8	-0.32
06/13/2002	10:03:12	165.33	7.106	11.344	25.2	511.1	-0.29
06/13/2002	10:04:12	165.15	7.092	11.357	25.73	511.1	-0.31
06/13/2002	10:05:12	167.27	7.141	11.311	26.11	512.4	-0.28
06/13/2002	10:06:12	169.83	7.105	11.317	26.22	514.1	-0.27
06/13/2002	10:07:12	170.04	7.128	11.326	26.23	515.4	-0.3
06/13/2002	10:08:12	170.77	7.11	11.331	26.49	515.4	-0.27
06/13/2002	10:09:12	170.85	7.118	11.322	26.25	515.4	-0.28
06/13/2002	10:10:12	173.42	7.127	11.32	26.39	515.3	-0.28
06/13/2002	10:11:12	172.71	7.095	11.331	26.32	514.4	-0.3
06/13/2002	10:12:12	173.63	7.125	11.334	26.47	514	-0.29
06/13/2002	10:13:12	171.98	7.091	11.342	26.43	512.8	-0.31
06/13/2002	10:14:12	173.66	7.11	11.334	26.51	512.8	-0.3
06/13/2002	10:15:12	176.04	7.137	11.296	26.42	513.4	-0.29
06/13/2002	10:16:12	175.67	7.119	11.305	26.85	514.2	-0.28
06/13/2002	10:17:12	172.34	7.117	11.342	26.34	515.4	-0.28
06/13/2002	10:18:13	169.75	7.089	11.341	26.08	515.4	-0.31
06/13/2002	10:19:13	168.55	7.114	11.337	25.92	515.4	-0.3
06/13/2002	10:20:13	171.75	7.155	11.261	25.5	515	-0.31
06/13/2002	10:21:13	174.16	7.131	11.295	25.32	517.1	-0.34
06/13/2002	10:22:13	170.87	7.146	11.291	25.67	516.6	-0.3
06/13/2002	10:23:13	170.06	7.113	11.301	25.58	517.8	-0.28
06/13/2002	10:24:11	170.06	7.137	11.301	25.41	519.3	-0.26
06/13/2002	10:25:11	169.57	7.117	11.328	25.59	518.8	-0.29
06/13/2002	10:26:11	167.19	7.073	11.365	25.83	517.1	-0.26
06/13/2002	10:27:11	165.37	7.121	11.339	25.55	516.4	-0.27
06/13/2002	10:28:11	167.62	7.09	11.346	25.29	516.4	-0.31
06/13/2002	10:29:11	166.31	7.114	11.33	25.34	515.7	-0.34
06/13/2002	10:30:11	168.64	7.096	11.346	24.9	514.6	-0.36
06/13/2002	10:31:11	166.09	7.099	11.332	25.05	515.3	-0.34
06/13/2002	10:32:11	167.81	7.127	11.321	23.93	514.6	-0.33
06/13/2002	10:33:11	164.05	7.118	11.302	21.76	518.3	-0.38
06/13/2002	10:34:11	158.6	7.119	11.327	21.51	519.7	-0.38
06/13/2002	10:35:11	157.83	7.107	11.325	21.56	519.4	-0.39
06/13/2002	10:36:11	158.56	7.111	11.32	21.86	518.2	-0.38
06/13/2002	10:37:11	159.72	7.115	11.328	22.01	515.8	-0.37
06/13/2002	10:38:11	161.55	7.115	11.3	22.18	515.3	-0.38
06/13/2002	10:39:11	163.87	7.129	11.316	22.87	515.7	-0.38
	Average	167.9	7.1	11.3	25.0	515.2	-0.3

Data Summary

Run	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
Run 1	07:31-08:10	136.8	6.9	11.7	30.6	472.3	-0.2
Run 2	08:45-09:24	161.6	7.1	11.4	26.6	499.4	-0.3
Run 3	10:00-10:39	167.9	7.1	11.3	25.0	515.2	-0.3

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 100% Load
Date:	06/13/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO
Molecular Weight:	28.01

Run No.	Start-Stop Time	Raw Data (ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
			Cma	Co	Cm	
1	07:31-08:10	136.8	149.4	0.7	152.0	134.38
2	08:45-09:24	161.6	149.4	0.8	152.0	158.86
3	10:00-10:39	167.9	149.4	0.8	151.5	165.69
					Average	152.98

<u>Calibration Error Correction</u>

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

<u>Mass Emission Rate (lb/hr)</u>

E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000

<u>Mass Emission Rate (lb/1000 lb fuel)</u>

E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 100% Load
Date:	06/13/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	07:31-08:10	6.9	20.5	0.0	20.6	6.87
2	08:45-09:24	7.1	20.5	0.0	20.6	7.02
3	10:00-10:39	7.1	20.5	0.0	20.6	7.10
					Average	7.00

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 100% Load
Date:	06/13/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	O2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	07:31-08:10	11.7	10.5	0.0	10.6	11.55
2	08:45-09:24	11.4	10.5	0.0	10.6	11.31
3	10:00-10:39	11.3	10.5	0.0	10.6	11.22
					Average	11.36

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Total Hydrocarbon Data Correction

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 100% Load
Date:	06/13/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	THC
Molecular Weight:	16.00

			Source Information		Corrected
Run No.	Start-Stop Time	Raw Data (ppm)	Stack Flow (dscfm)	Stack Moisture (%)	Data Dry Basis (ppm)
1	07:31-08:10	30.6	377.50	6.43	32.68
2	08:45-09:24	26.6	378.00	5.78	28.28
3	10:00-10:39	25.0	371.30	6.81	26.86
				Average	29.28

Moisture Correction

Cgas(dry)=Cgas(wet)/(1-(% moisture/100))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas(dry)*MWgas*Qs(dscfm)*60/385300000

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 1 - 100% Load
Date:	06/13/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	N0x
Molecular Weight:	46.01

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
			Cma	Co	Cm	
1	07:31-08:10	472.3	448.0	1.0	442.5	478.21
2	08:45-09:24	499.4	448.0	2.6	442.5	505.95
3	10:00-10:39	515.2	448.0	3.6	441.5	523.43
				Average		502.53

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000

Mass Emission Rate (lb/1000 lb fuel)

E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

Date:	Run:	T-100-1			Horsepower:		133.64	
06/13/2002	Flow (dscfm):	377.5			Fuel Usage (gal/hr):		7.27	
	Moisture (%):	6.43						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	478.21	134.38	32.68	32 68	0.00	6.87	11.55
	Mass Rate (lb/hr)	1.29	0.22	0.03	3.05E-02	0.00E+00	0.02	0.02
	Mass Rate (lb/gal fuel)	0.18	0.03	0.00	0.00	0.00	0.00	0.00
	Mass Rate (gr/hp*hr)	4.39	0.75	0.10	0.10	0.00	0.06	0.07

Date:	Run:	T-100-2			Horsepower:		147.61	
06/13/2002	Flow (dscfm):	378			Fuel Usage (gal/hr):		8.03	
	Moisture (%):	5.78						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	505.95	158.86	28.28	28.28	0.00	7.02	11.31
	Mass Rate (lb/hr)	1.37	0.26	0.03	2.65E-02	0.00E+00	0 02	0.02
	Mass Rate (lb/gal fuel)	0.17	0.03	0.00	0.00	0.00	0 00	0 00
	Mass Rate (gr/hp*hr)	4.21	0.81	0.08	0.08	0.00	0.06	0.07

Date:	Run:	T-100-3			Horsepower:		149.23	
06/13/2002	Flow (dscfm):	371.3			Fuel Usage (gal/hr):		8 12	
	Moisture (%):	6.81						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	523.43	165.69	26.86	26.86	0.00	7 10	11.22
	Mass Rate (lb/hr)	1.39	0.27	0.02	2.47E-02	0.00E+00	0.02	0.02
	Mass Rate (lb/gal fuel)	0.17	0.03	0.00	0.00	0.00	0 00	0 00
	Mass Rate (gr/hp*hr)	4.24	0.82	0.08	0.08	0.00	0.05	0.06

Date:	Run:	T-2-100			Horsepower:		143.49	
06/13/2002	Flow (dscfm):	386			Fuel Usage (gal/hr):		7.81	
	Moisture (%):	6.3						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	448.97	165.28	49.28	49.30	0.02	6.35	12.23
	Mass Rate (lb/hr)	1.24	0.28	0 05	4 71E-02	1 92E-05	0 02	0.02
	Mass Rate (lb/gal fuel)	0.16	0.04	0 01	0.01	0.00	0 00	0 00
	Mass Rate (gr/hp*hr)	3.93	0.88	0.15	0.15	0.00	0.05	0.07

CEM CALIBRATION DATA

Plant Name	Travis AFB
Sampling Location	Generator 2
Date	06/13/2002
Run Number	
Start Time	
Stop Time	

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.6	0.3	0.8	-0.1	0.6	0.0	-0.1	Co=0.7
CO Low	~30	30.1									
CO Mid	~60	59.4									
CO High	80-100 (2)	149.4		152	1.3	151	-0.5	152	0.0	0.5	Cm=151.5
CO2 Zero	0	0		-0.2	-0.8	0.1	1.2	-0.1	0.4	-0.8	Co=0.0
CO2 Low	NR										
CO2 Mid	40-60	9.9									
CO2 High	80-100	20.5		20.7	0.8	20.5	-0.8	20.6	-0.4	0.4	Cm=20.6
O2 Zero	0	0		0	0.0	0	0.0	0	0.0	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.7	0.8	10.6	-0.4	10.6	-0.4	0.0	Cm=10.6
O2 High	80-100	20									
THC Zero	0	0		0		4.3	1.4	8.4		1.4	
THC Low	25-35	49.6				47.7	-0.6	55.6		2.6	
THC Mid	45-55	124.6									
THC High	80-90	298.6		295							
NOx Zero	0	0		-1	-0.1	4	0.5	1	0.2	-0.3	Co=2.5
NOx Low	20-30 (3)										
NOx Mid	45-55	448				441	-0.7	440	-0.8	-0.1	Cm=440.5
NOx High	80-90	885.5		881	-0.5						

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

10%		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/13/2002	11:40:50	153.65	3.248	16.725	98.12	206.1	1.45
06/13/2002	11:41:50	157.34	3.274	16.723	97.41	206.2	1.44
06/13/2002	11:42:50	159.5	3.259	16.708	96.59	206.2	1.44
06/13/2002	11:43:50	159.45	3.282	16.704	95.77	206.6	1.41
06/13/2002	11:44:50	158.89	3.268	16.705	94.96	207.2	1.38
06/13/2002	11:45:51	156.97	3.275	16.695	94.18	207.2	1.38
06/13/2002	11:46:51	157.9	3.3	16.674	93.76	208	1.41
06/13/2002	11:47:51	159.69	3.284	16.663	93.07	208.7	1.39
06/13/2002	11:48:51	156.41	3.288	16.701	92.78	208.6	1.36
06/13/2002	11:49:51	153.48	3.292	16.66	92.48	208.2	1.37
06/13/2002	11:50:51	151.2	3.301	16.661	92.73	210.2	1.35
06/13/2002	11:51:51	152.11	3.308	16.652	92.13	210.2	1.33
06/13/2002	11:52:51	152.85	3.293	16.657	91.99	210.8	1.34
06/13/2002	11:53:51	152.92	3.322	16.653	91.42	211.2	1.3
06/13/2002	11:54:51	153.76	3.299	16.644	91.31	211.2	1.31
06/13/2002	11:55:51	154.27	3.318	16.643	91.02	211.2	1.28
06/13/2002	11:56:51	154.55	3.318	16.635	90.82	211.2	1.28
06/13/2002	11:57:51	154.8	3.305	16.641	90.82	211.2	1.28
06/13/2002	11:58:51	151.82	3.325	16.638	90.79	211.2	1.25
06/13/2002	11:59:51	152.22	3.29	16.625	90.48	210.6	1.2
	Average	155.2	3.3	16.7	93.1	209.1	1.3

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

25%		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/13/2002	12:13:50	148.21	3.953	15.733	90.2	219.2	1.01
06/13/2002	12:14:50	149.96	3.924	15.732	87.08	220.2	1.01
06/13/2002	12:15:50	148.36	3.929	15.771	82.63	219.9	0.92
06/13/2002	12:16:50	143.59	3.894	15.797	81.93	217 1	0.94
06/13/2002	12:17:50	143.26	3.948	15.725	82.35	217.3	0.96
06/13/2002	12:18:50	143.73	3.977	15.681	83.43	219.2	0.92
06/13/2002	12:19:50	142.08	3.964	15.689	83.34	220.8	0.9
06/13/2002	12:20:50	141.67	3.999	15.658	85.11	221.5	0.9
06/13/2002	12:21:50	139.6	3.971	15.654	84.82	222.2	0.91
06/13/2002	12:22:50	140.01	3.988	15.646	82.05	223	0.92
06/13/2002	12:23:50	141 12	3.983	15.649	81.27	223.2	0.91
06/13/2002	12:24:50	141.49	3.957	15.635	80.7	223.2	0.85
06/13/2002	12:25:50	147.03	3.994	15.646	80.73	222.4	0.92
06/13/2002	12:26:50	146.6	3.971	15.644	80.86	222	0.91
06/13/2002	12:27:51	145.65	3.991	15.642	80.72	221.9	0.92
06/13/2002	12:28:51	146.98	3.983	15.633	80.69	221.8	0.91
06/13/2002	12:29:51	145.22	3.987	15.628	81.45	222.2	0.9
06/13/2002	12:30:51	141 74	3.994	15.641	82.59	222.2	0.93
06/13/2002	12:31:51	139.89	3.974	15.633	84.6	222.2	0.92
06/13/2002	12:32:51	138.87	3.998	15.642	82.9	222.2	0.94
	Average	143.8	4.0	15.7	83.0	221.2	0.9

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

50%		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/13/2002	12:43:51	143.09	5.346	13.703	64.68	261.2	0.51
06/13/2002	12:44:51	144.76	5.291	13.812	67 71	261.4	0.52
06/13/2002	12:45:51	136.4	5.214	13.904	65.26	257.2	0.52
06/13/2002	12:46:49	140.51	5.367	13.7	67.3	256.8	0.5
06/13/2002	12:47:49	146.72	5.386	13.707	68.49	261.5	0.53
06/13/2002	12:48:49	147.45	5.373	13.691	68.21	261.2	0.54
06/13/2002	12:49:49	146.31	5.386	13.689	65.91	261 7	0.54
06/13/2002	12:50:50	146.31	5.378	13.702	63.47	261 4	0.49
06/13/2002	12:51:50	145.5	5.353	13.708	63.42	261.8	0.47
06/13/2002	12:52:50	146.82	5.373	13.714	63.52	261 7	0.47
06/13/2002	12:53:50	146.41	5.341	13.716	63.79	261.2	0.47
06/13/2002	12:54:50	146.64	5.365	13.712	64.08	260.5	0.47
06/13/2002	12:55:50	146.43	5.36	13.71	63.51	261.2	0.44
06/13/2002	12:56:50	139.44	5.233	13.867	62.46	261.4	0.44
06/13/2002	12:57:50	133.62	5.275	13.837	70.34	257	0.47
06/13/2002	12:58:50	140.94	5.355	13.7	77.05	260.2	0.53
06/13/2002	12:59:50	140.73	5.379	13.699	72.49	262.5	0.52
06/13/2002	13:00:50	140.6	5.349	13.711	68.45	263.2	0.49
06/13/2002	13:01:50	141.9	5.362	13.704	66.37	262.4	0.51
06/13/2002	13:02:50	139.84	5.365	13.713	64.58	262.5	0.45
	Average	143.0	5.3	13.7	68.6	260.9	0.5

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

75%		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/13/2002	13:10:51	141.4	6.012	12.852	55.43	328.6	0.31
06/13/2002	13:11:51	150.5	6.045	12.831	56.14	333.6	0.21
06/13/2002	13:12:51	151.43	6.051	12.814	54.27	333.7	0.21
06/13/2002	13:13:51	150.4	6.017	12.822	54.07	334.4	0.2
06/13/2002	13:14:51	145.73	6.022	12.798	54.74	334.4	0.19
06/13/2002	13:15:51	148.34	6.016	12.785	67.69	333.2	0.26
06/13/2002	13:16:51	148.09	6.042	12.792	61 18	334.9	0.26
06/13/2002	13:17:51	142.47	6.019	12.775	59.45	336.2	0.2
06/13/2002	13:18:51	148.02	6.001	12.829	57.3	335	0.25
06/13/2002	13:19:51	147.54	6.025	12.816	56.58	333.6	0.23
06/13/2002	13:20:51	153.02	6.029	12.784	54.71	336.7	0.23
06/13/2002	13:21:51	151 79	6.08	12.754	54.41	337.4	0.22
06/13/2002	13:22:51	152.52	6.04	12.771	53.4	339	0.17
06/13/2002	13:23:51	152.59	6.035	12.8	52.84	340.2	0.15
06/13/2002	13:24:51	150.3	6.038	12.794	52.92	339.5	0.13
06/13/2002	13:25:51	149.9	5.967	12.85	58.53	338.8	0.17
06/13/2002	13:26:51	145.38	5.843	13.081	55.8	337.2	0.16
06/13/2002	13:27:51	150.39	6.029	12.788	54.08	334.7	0.14
06/13/2002	13:28:51	154.44	6.029	12.817	54.78	342.3	0.2
06/13/2002	13:29:49	152.16	6.009	12.83	53.99	342.7	0.17
	Average	149.3	6.0	12.8	56.1	336.3	0.2

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

100%		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/13/2002	13:41:50	150.36	6.249	12.54	46.8	430.8	0.01
06/13/2002	13:42:50	167 74	6.443	12.237	45.36	435.6	0.02
06/13/2002	13:43:50	176.21	6.446	12.27	45.02	441.8	0.03
06/13/2002	13:44:50	174.2	6.441	12.241	45.44	442.5	0
06/13/2002	13:45:50	172.42	6.451	12.243	45.92	445.6	0.02
06/13/2002	13:46:50	172.25	6.45	12.247	44.66	448.7	0
06/13/2002	13:47:50	173.8	6.405	12.256	45.32	448.7	-0.01
06/13/2002	13:48:50	168.93	6.392	12.34	45.29	450.8	0.01
06/13/2002	13:49:50	159.74	6.327	12.401	45.83	450.5	0.03
06/13/2002	13:50:50	170.96	6.426	12.279	44.82	449.8	0.01
06/13/2002	13:51:50	170.17	6.434	12.265	44.33	450.4	-0.01
06/13/2002	13:52:51	168.61	6.42	12.267	47.02	452.3	0.01
06/13/2002	13:53:51	169.58	6.413	12.308	45.88	454.3	0.01
06/13/2002	13:54:51	159.16	6.222	12.529	46.52	444.5	0.02
06/13/2002	13:55:51	160.91	6.318	12.429	46.01	427 1	-0.01
06/13/2002	13:56:51	164.66	6.296	12.444	46.56	433.1	-0.01
06/13/2002	13:57:51	166.39	6.308	12.418	48.3	431.3	0.02
06/13/2002	13:58:51	167.27	6.322	12.419	47.98	430.5	0.05
06/13/2002	13:59:51	168.82	6.291	12.423	47.79	430.8	0.04
06/13/2002	14:00:51	168.41	6.318	12.426	49.2	429.8	0.09
	Average	167.5	6.4	12.3	46.2	441.4	0.0

Data Summary		CO	CO2	O2	THC	NOx	Methane
Run	Time	ppm	%	%	ppm	ppm	ppm
10%	11:40-11:59	155.2	3.3	16.7	93.1	209.1	1.35
25%	12:13-12:32	143.8	4.0	15.7	83.0	221.2	0.93
50%	12:43-13:02	143.0	5.3	13.7	66.6	260.9	0.49
75%	13:10-13:29	149.3	6.0	12.8	56.1	336.3	0.20
100%	13:41-14:00	167.5	6.4	12.3	46.2	441.4	0.02

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

10%		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/13/2002	11:40:50	153.65	3.248	16.725	98.12	206.1	1.45
06/13/2002	11:41:50	157.34	3.274	16.723	97.41	206.2	1.44
06/13/2002	11:42:50	159.5	3.259	16.708	96.59	206.2	1.44
06/13/2002	11:43:50	159.45	3.282	16.704	95.77	206.6	1.41
06/13/2002	11:44:50	158.89	3.268	16.705	94.96	207.2	1.38
06/13/2002	11:45:51	156.97	3.275	16.695	94.18	207.2	1.38
06/13/2002	11:46:51	157.9	3.3	16.674	93.76	208	1.41
06/13/2002	11:47:51	159.69	3.284	16.663	93.07	208.7	1.39
06/13/2002	11:48:51	156.41	3.288	16.701	92.78	208.6	1.36
06/13/2002	11:49:51	153.48	3.292	16.68	92.48	208.2	1.37
06/13/2002	11:50:51	151.2	3.301	16.661	92.73	210.2	1.35
06/13/2002	11:51:51	152.11	3.308	16.652	92.13	210.2	1.33
06/13/2002	11:52:51	152.85	3.293	16.657	91.99	210.8	1.34
06/13/2002	11:53:51	152.92	3.322	16.653	91.42	211.2	1.3
06/13/2002	11:54:51	153.76	3.299	16.644	91.31	211.2	1.31
06/13/2002	11:55:51	154.27	3.318	16.643	91.02	211.2	1.28
06/13/2002	11:56:51	154.55	3.318	16.635	90.82	211.2	1.28
06/13/2002	11:57:51	154.8	3.305	16.641	90.82	211.2	1.28
06/13/2002	11:58:51	151.82	3.325	16.638	90.79	211.2	1.25
06/13/2002	11:59:51	152.22	3.29	16.625	90.48	210.6	1.2
	Average	155.2	3.3	16.7	93.1	209.1	1.3

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

25%		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/13/2002	12:13:50	148.21	3.953	15.733	90.2	219.2	1.01
06/13/2002	12:14:50	149.96	3.924	15.732	87.08	220.2	1.01
06/13/2002	12:15:50	148.36	3.929	15.771	82.63	219.9	0.92
06/13/2002	12:16:50	143.59	3.894	15.797	81.93	217 1	0.94
06/13/2002	12:17:50	143.26	3.948	15.725	82.35	217.3	0.96
06/13/2002	12:18:50	143.73	3.977	15.681	83.43	219.2	0.92
06/13/2002	12:19:50	142.08	3.964	15.669	83.34	220.8	0.9
06/13/2002	12:20:50	141.67	3.989	15.658	85.11	221.5	0.9
06/13/2002	12:21:50	139.6	3.971	15.654	84.82	222.2	0.91
06/13/2002	12:22:50	140.01	3.988	15.646	82.05	223	0.92
06/13/2002	12:23:50	141 12	3.983	15.649	81.27	223.2	0.91
06/13/2002	12:24:50	141.49	3.957	15.635	80.7	223.2	0.85
06/13/2002	12:25:50	147.03	3.994	15.646	80.73	222.4	0.92
06/13/2002	12:26:50	146.6	3.971	15.644	80.86	222	0.91
06/13/2002	12:27:51	145.65	3.991	15.642	80.72	221.9	0.92
06/13/2002	12:28:51	146.98	3.963	15.633	80.69	221.8	0.91
06/13/2002	12:29:51	145.22	3.987	15.628	81.45	222.2	0.9
06/13/2002	12:30:51	141 74	3.994	15.641	82.59	222.2	0.93
06/13/2002	12:31:51	139.89	3.974	15.633	84.6	222.2	0.92
06/13/2002	12:32:51	138.87	3.998	15.642	82.9	222.2	0.94
	Average	143.8	4.0	15.7	83.0	221.2	0.9

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

50%		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/13/2002	12:43:51	143.09	5.346	13.703	64.68	261.2	0.51
06/13/2002	12:44:51	144.78	5.291	13.812	67 71	261.4	0.52
06/13/2002	12:45:51	136.4	5.214	13.904	65.26	257.2	0.52
06/13/2002	12:46:49	140.51	5.367	13.7	67.3	256.8	0.5
06/13/2002	12:47:49	146.72	5.386	13.707	68.49	261.5	0.53
06/13/2002	12:48:49	147.45	5.373	13.691	68.21	261.2	0.54
06/13/2002	12:49:49	146.31	5.386	13.689	65.91	261 7	0.54
06/13/2002	12:50:50	146.31	5.378	13.702	63.47	261.4	0.49
06/13/2002	12:51:50	145.5	5.353	13.708	63.42	261.8	0.47
06/13/2002	12:52:50	146.82	5.373	13.714	63.52	261 7	0.47
06/13/2002	12:53:50	146.41	5.341	13.716	63.79	261.2	0.47
06/13/2002	12:54:50	146.64	5.365	13.712	64.08	260.5	0.47
06/13/2002	12:55:50	146.43	5.36	13.71	63.51	261.2	0.44
06/13/2002	12:56:50	139.44	5.233	13.867	62.46	261.4	0.44
06/13/2002	12:57:50	133.62	5.275	13.837	70.34	257	0.47
06/13/2002	12:58:50	140.94	5.355	13.7	77.05	260.2	0.53
06/13/2002	12:59:50	140.73	5.379	13.699	72.49	262.5	0.52
06/13/2002	13:00:50	140.6	5.349	13.711	68.45	263.2	0.49
06/13/2002	13:01:50	141.9	5.362	13.704	66.37	262.4	0.51
06/13/2002	13:02:50	139.84	5.365	13.713	64.58	262.5	0.45
	Average	143.0	5.3	13.7	66.6	260.9	0.5

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

75%		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/13/2002	13:10:51	141.4	6.012	12.852	55.43	328.6	0.31
06/13/2002	13:11:51	150.5	6.045	12.831	55.14	333.6	0.21
06/13/2002	13:12:51	151.43	6.051	12.814	54.27	333.7	0.21
06/13/2002	13:13:51	150.4	6.017	12.822	54.07	334.4	0.2
06/13/2002	13:14:51	145.73	6.022	12.798	54.74	334.4	0.19
06/13/2002	13:15:51	148.34	6.016	12.785	67.69	333.2	0.26
06/13/2002	13:16:51	148.09	6.042	12.792	61 18	334.9	0.26
06/13/2002	13:17:51	142.47	6.019	12.775	59.45	336.2	0.2
06/13/2002	13:18:51	148.02	6.001	12.829	57.3	335	0.25
06/13/2002	13:19:51	147.54	6.025	12.816	56.58	333.6	0.23
06/13/2002	13:20:51	153.02	6.029	12.784	54.71	336.7	0.23
06/13/2002	13:21:51	151 79	6.08	12.754	54.41	337.4	0.22
06/13/2002	13:22:51	152.52	6.04	12.771	53.4	339	0.17
06/13/2002	13:23:51	152.59	6.035	12.8	52.84	340.2	0.15
06/13/2002	13:24:51	150.3	6.038	12.794	52.82	339.5	0.13
06/13/2002	13:25:51	149.9	5.987	12.85	58.53	338.8	0.17
06/13/2002	13:26:51	145.38	5.843	13.081	55.8	337.2	0.16
06/13/2002	13:27:51	150.39	6.029	12.788	54.08	334.7	0.14
06/13/2002	13:28:51	154.44	6.029	12.817	54.78	342.3	0.2
06/13/2002	13:29:49	152.16	6.009	12.83	53.99	342.7	0.17
	Average	149.3	6.0	12.8	56.1	336.3	0.2

CEM Data

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

100%		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/13/2002	13:41:50	150.36	6.249	12.54	46.8	430.8	0.01
06/13/2002	13:42:50	167 74	6.443	12.237	45.36	435.6	0.02
06/13/2002	13:43:50	176.21	6.446	12.27	45.02	441.8	0.03
06/13/2002	13:44:50	174.2	6.441	12.241	45.44	442.5	0
06/13/2002	13:45:50	172.42	6.451	12.243	45.92	445.6	0.02
06/13/2002	13:46:50	172.25	6.45	12.247	44.66	448.7	0
06/13/2002	13:47:50	173.8	6.405	12.256	45.32	448.7	-0.01
06/13/2002	13:48:50	168.93	6.392	12.34	45.29	450.8	0.01
06/13/2002	13:49:50	159.74	6.327	12.401	45.83	450.5	0.03
06/13/2002	13:50:50	170.96	6.426	12.279	44.82	449.8	0.01
06/13/2002	13:51:50	170.17	6.434	12.265	44.33	450.4	-0.01
06/13/2002	13:52:51	168.61	6.42	12.267	47.02	452.3	0.01
06/13/2002	13:53:51	169.58	6.413	12.308	45.68	454.3	0.01
06/13/2002	13:54:51	159.16	6.222	12.529	46.52	444.5	0.02
06/13/2002	13:55:51	160.91	6.318	12.429	46.01	427 1	-0.01
06/13/2002	13:56:51	164.66	6.296	12.444	46.56	433.1	-0.01
06/13/2002	13:57:51	166.39	6.308	12.418	48.3	431.3	0.02
06/13/2002	13:58:51	167.27	6.322	12.419	47.98	430.5	0.05
06/13/2002	13:59:51	168.82	6.291	12.423	47.79	430.8	0.04
06/13/2002	14:00:51	168.41	6.318	12.426	49.2	429.8	0.09
	Average	167.5	6.4	12.3	46.2	441.4	0.0

Data Summary		CO	CO2	O2	THC	NOx	Methane
Run	Time	ppm	%	%	ppm	ppm	ppm
10%	11:40-11:59	155.2	3.3	16.7	93.1	209.1	1.36
25%	12:13-12:32	143.8	4.0	15.7	83.0	221.2	0.93
50%	12:43-13:02	143.0	5.3	13.7	66.6	260.9	0.49
75%	13:10-13:29	149.3	6.0	12.8	56.1	336.3	0.20
100%	13:41-14:00	167.5	6.4	12.3	46.2	441.4	0.02

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Date:	06/13/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO
Molecular Weight:	28.01

Run No.	Start-Stop Time	Raw Data (ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
10%	11:40-11:59	155.2	149.4	0.7	151.5	153.1
25%	12:13-12:32	143.8	149.4	0.7	151.5	141.7
50%	12:43-13:02	143.0	149.4	0.7	151.5	141.0
75%	13:10-13:29	149.3	149.4	0.7	151.5	147.2
100%	13:41-14:00	167.5	149.4	0.7	151.5	165.3
				Average		149.7

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000

Mass Emission Rate (lb/1000 lb fuel)

E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Date:	06/13/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
10%	11:40-11:59	3.3	20.5	0.0	20.6	3.3
25%	12:13-12:32	4.0	20.5	0.0	20.6	4.0
50%	12:43-13:02	5.3	20.5	0.0	20.6	5.3
75%	13:10-13:29	6.0	20.5	0.0	20.6	6.0
100%	13:41-14:00	6.4	20.5	0.0	20.6	6.4
					Average	5.0

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Date:	06/13/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	O2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
10%	11:40-11:59	16.7	10.5	0.0	10.6	16.5
25%	12:13-12:32	15.7	10.5	0.0	10.6	15.5
50%	12:43-13:02	13.7	10.5	0.0	10.6	13.6
75%	13:10-13:29	12.8	10.5	0.0	10.6	12.7
100%	13:41-14:00	12.3	10.5	0.0	10.6	12.2
					Average	14.1

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Total Hydrocarbon Data Correction

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Date:	06/13/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	THC
Molecular Weight:	16.00

			Source Information		Corrected
Run No.	Start-Stop Time	Raw Data (ppm)	Stack Flow (dscfm)	Stack Moisture (%)	Data Dry Basis (ppm)
10%	11:40-11:59	93.1	304	3.70	96.7
25%	12:13-12:32	83.0	321	4.10	86.5
50%	12:43-13:02	66.6	342	4.70	69.8
75%	13:10-13:29	56.1	358	5.90	59.6
100%	13:41-14:00	46.2	386	6.30	49.3
				Average	72.4

Moisture Correction

Cgas(dry)=Cgas(wet)/(1-(% moisture/100))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas(dry)*MWgas*Qs(dscfm)*60/385300000

CEM Data Correction Data Sheet

Plant Name:	Travis AFB
Sampling Location:	Gen. 2
Date:	06/13/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	N0x
Molecular Weight:	46.01

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
10%	11:40-11:59	209.1	448.0	2.5	440.5	211.3
25%	12:13-12:32	221.2	448.0	2.5	440.5	223.7
50%	12:43-13:02	260.9	448.0	2.5	440.5	264.3
75%	13:10-13:29	336.3	448.0	2.5	440.5	341.4
100%	13:41-14:00	441.4	448.0	2.5	440.5	449.0
					Average	297.9

<u>Calibration Error Correction</u>
Cgas=(Cobs-Co)*(Cma/(Cm-Co))
<u>Mass Emission Rate (lb/hr)</u>
E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000
<u>Mass Emission Rate (lb/1000 lb fuel)</u>
E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

CEM – GASEOUS POLLUTANTS
(CO, CO_2, O_2, THC, NO_X) -
ELMENDORF AFB

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	10% Load - Generator 1
Date	06/25/2002
Run Number	1
Start Time	0730
Stop Time	0815

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	SYSTEM CAL CHECK PRETEST System Response	PRETEST Syst. Bias (% of Span)	POST TEST System Response	POST TEST Syst. Bias (% of Span)	POST TEST Drift (% of Span)	Calibration Correction Factors
CO Zero	0	0		0.4	0.2	0.3	0.1	0.4	0.0	0.1	Co=0.4
CO Low	~30	30.1		29.5	-0.3						
CO Mid	~60	59.4		58.5	-0.4						
CO High	80-100 (2)	149.4		149	-0.2	149	0.0	148	-0.5	-0.5	Cm=148.5
CO2 Zero	0	0		-0.2	-0.8	-0.2	0.0	-0.2	0.0	0.0	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	10.1	0.4	10	0.0	-0.4	Cm=10.1
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		-0.1	-0.4	0	0.4	0	0.4	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		19.9	-0.4	20	0.4	19.9	0.0	-0.4	Cm=20.0
THC Zero	0	0		-0.2		2.7	1.0	6.3		1.2	
THC Low	25-35	49.6		48.4	-2.4	50.1	0.6				
THC Mid	45-55	124.6		121	-2.9	123.5	0.8	127		1.2	
THC High	80-90	298.6		297		295	-0.7				
NOx Zero	0	0		0.4	0.0	1	0.1	0.4	0.0	-0.1	Co=0.7
NOx Low	20-30 (3)										
NOx Mid	45-55	448		444	-0.4	445	0.1	445	0.1	0.0	Cm=445.0
NOx High	80-90	885.5		883	-0.3						

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	10% Load - Generator 1
Date	06/25/02
Run Number	2
Start Time	0845
Stop Time	0930

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	SYSTEM CAL CHECK PRETEST System Response	PRETEST Syst. Bias (% of Span)	POST TEST System Response	POST TEST Syst. Bias (% of Span)	POST TEST Drift (% of Span)	Calibration Correction Factors
CO Zero	0	0		0.4	0.2	0.4	0.0	0.3	-0.1	-0.1	Co=0.4
CO Low	~30	30.1		29.5	-0.3						
CO Mid	~60	59.4		58.5	-0.4						
CO High	80-100 (2)	149.4		149	-0.2	148	-0.5	148	-0.5	0.0	Cm=148.0
CO2 Zero	0	0		-0.2	-0.8	-0.2	0.0	-0.1	0.4	0.4	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	10	0.0	10	0.0	0.0	Cm=10.0
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		-0.1	-0.4	0	0.4	0	0.4	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		19.9	-0.4	19.9	0.0	19.9	0.0	0.0	Cm=19.9
THC Zero	0	0		-0.2		6.3	2.2	6.4		0.0	
THC Low	25-35	49.6		48.4	-2.4						
THC Mid	45-55	124.6		121	-2.9	127	2.0	128		0.3	
THC High	80-90	298.6		297							
NOx Zero	0	0		0.4	0.0	0.4	0.0	0.4	0.0	0.0	Co=0.4
NOx Low	20-30 (3)										
NOx Mid	45-55	448		444	-0.4	445	0.1	444	0.0	-0.1	Cm=444.5
NOx High	80-90	885.5		883	-0.3						

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	10% Load - Generator 1
Date	06/25/02
Run Number	3
Start Time	1005
Stop Time	1050

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	SYSTEM CAL CHECK PRETEST System Response	Syst. Bias (% of Span)	POST TEST System Response	Syst. Bias (% of Span)	Drift (% of Span)	Calibration Correction Factors
CO Zero	0	0		0.4	0.2	0.3	0.1	0.3	-0.1	0.0	Co=0.3
CO Low	~30	30.1		29.5	-0.3						
CO Mid	~60	59.4		58.5	-0.4						
CO High	80-100 (2)	149.4		149	-0.2	148	-0.5	148	-0.5	0.0	Cm=148.0
CO2 Zero	0	0		-0.2	-0.8	-0.1	0.4	-0.1	0.4	0.0	-Co=0.1
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	10	0.0	10	0.0	0.0	Cm=10.0
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		-0.1	-0.4	0	0.4	0	0.4	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		19.9	-0.4	19.9	0.0	19.9	0.0	0.0	Cm=19.9
THC Zero	0	0		-0.2		6.4	2.2	6.6		0.1	
THC Low	25-35	49.6		48.4	-2.4						
THC Mid	45-55	124.6		121	-2.9	128	2.3	129		0.3	
THC High	80-90	298.6		297							
NOx Zero	0	0		0.4	0.0	0.4	0.0	0.4	0.0	0.0	Co=0.4
NOx Low	20-30 (3)										
NOx Mid	45-55	448		444	-0.4	444	0.0	444	0.0	0.0	Cm=444.0
NOx High	80-90	885.5		883	-0.3						

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 10% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 1		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/25/2002	7:30:46	136.07	3.24	16.45	95.59	181.5	1.45
06/25/2002	7:31:46	133.82	3.257	16.459	95.69	181.5	1.48
06/25/2002	7:32:46	132.87	3.236	16.465	95.34	181 5	1.47
06/25/2002	7:33:44	130 45	3.233	16.472	94.39	180.8	1.46
06/25/2002	7:34:44	130 18	3.251	16.471	93.38	181	1.47
06/25/2002	7:35:44	129.31	3.221	16.475	94 51	180.4	1.45
06/25/2002	7:36:44	128.78	3.233	16.481	94.19	179.5	1.45
06/25/2002	7:37:44	127.65	3.227	16.479	94.29	179.5	1.44
06/25/2002	7:38:44	128.68	3.219	16.482	94.14	179.5	1.45
06/25/2002	7:39:44	128.18	3.237	16.477	93.38	179.5	1.45
06/25/2002	7:40:44	128.12	3.209	16.481	93.36	179.5	1.45
06/25/2002	7:41:44	128.54	3.235	16.479	94.14	179.5	1.45
06/25/2002	7:42:44	127.37	3.222	16.478	94.81	179.3	1.43
06/25/2002	7:43:44	126.95	3.224	16.476	94.29	179.5	1.44
06/25/2002	7:44:44	126.27	3.231	16.476	94.25	179.5	1.44
06/25/2002	7:45:44	125.67	3.205	16.481	93.31	179.5	1.41
06/25/2002	7:46:44	126.04	3.228	16.488	93.3	179	1.41
06/25/2002	7:47:44	126 35	3.209	16.487	96.39	178.1	1.37
06/25/2002	7:48:44	126.44	3.222	16.484	95.94	178	1.39
06/25/2002	7:49:45	124.33	3.222	16.482	107.65	178.5	1 36
06/25/2002	7:50:45	124.09	3.207	16.48	102 03	178.1	1.49
06/25/2002	7:51:45	124.44	3.229	16.481	104.19	177.5	1.52
06/25/2002	7:52:45	124.76	3.205	16.481	102.06	177.3	1.45
06/25/2002	7:53:45	124 36	3.222	16.483	101.26	177.2	1.39
06/25/2002	7:54:45	123.23	3.214	16.483	101.53	177.5	1.38
06/25/2002	7:55:45	123.68	3.212	16.472	102.54	176.9	1.41
06/25/2002	7:56:45	123.88	3.238	16.464	101.95	176.5	1.44
06/25/2002	7:57:45	124.08	3.214	16.463	101.8	176.5	1.44
06/25/2002	7:58:45	123.55	3.23	16.431	100 91	176.6	1.36
06/25/2002	7:59:45	122.66	3.223	16.455	99.62	177.4	1.39
06/25/2002	8:00:45	122.74	3.226	16.465	99.64	176.5	1.41
06/25/2002	8:01:45	123.2	3.236	16.456	101.84	176.5	1.42
06/25/2002	8:02:45	121.84	3.217	16.461	102.39	176.5	1.39
06/25/2002	8:03:45	121.29	3.24	16.466	101.11	176.5	1.4
06/25/2002	8:04:45	121.44	3.215	16.471	101.28	175.9	1.37
06/25/2002	8:05:45	121.42	3.228	16.471	101.68	175.5	1.38
06/25/2002	8:06:45	121.49	3.225	16.472	105.11	176	1.41
06/25/2002	8:07:45	121.2	3.21	16.477	105.32	175 5	1.4
06/25/2002	8:08:45	122.23	3.229	16.476	104.64	175.5	1.39
06/25/2002	8:09:46	121.48	3.205	16.476	106.35	175.5	1.41
06/25/2002	8:10:46	122.04	3.222	16.477	103.74	175.5	1 39
06/25/2002	8:11:46	121.85	3.216	16.473	103.83	175.5	1.38
06/25/2002	8:12:46	121.87	3.211	16.479	103.7	175.5	1.4
06/25/2002	8:13:46	121.93	3.229	16.472	103.31	175.4	1.39
06/25/2002	8:14:44	121.68	3 209	16.474	105.08	174.5	1 38
	Average	125.3	3.2	16.5	99.3	177.8	1.4

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 10% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 2

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/25/2002	8:45:36	121.13	3.237	16.448	100	171.5	1.43
06/25/2002	8:46:36	121.33	3.233	16.447	101.36	172.2	1.45
06/25/2002	8:47:36	121.23	3.234	16.445	101.37	172.1	1.43
06/25/2002	8:48:36	120.83	3.246	16.439	101.44	170.9	1.41
06/25/2002	8:49:37	119.76	3.226	16.44	106.78	170.5	1.37
06/25/2002	8:50:37	119	3.251	16.439	109.37	170.5	1.41
06/25/2002	8:51:37	118.64	3.238	16.439	104.81	170.5	1.42
06/25/2002	8:52:37	118.04	3.242	16.438	104.53	170.5	1.42
06/25/2002	8:53:37	118.27	3.247	16.441	106.05	170.5	1.45
06/25/2002	8:54:37	120.1	3.228	16.443	103.95	170.5	1.46
06/25/2002	8:55:37	119.54	3.251	16.443	102.71	169.7	1.46
06/25/2002	8:56:37	119.07	3.232	16.44	103.32	170.5	1.45
06/25/2002	8:57:37	118.92	3.243	16.44	102.54	169.5	1.44
06/25/2002	8:58:37	118.69	3.244	16.436	102.28	169.7	1.44
06/25/2002	8:59:37	118.46	3.232	16.441	101.78	170.9	1.43
06/25/2002	9:00:37	118.76	3.252	16.438	101.78	170.5	1.42
06/25/2002	9:01:37	119.39	3.226	16.441	101.26	170.5	1.39
06/25/2002	9:02:37	119.47	3.245	16.442	101.83	170.5	1.4
06/25/2002	9:03:37	119.61	3.238	16.438	101.97	170.5	1.41
06/25/2002	9:04:37	118.9	3.236	16.445	100.58	169.7	1.39
06/25/2002	9:05:37	118.37	3.252	16.433	101.67	169.5	1.41
06/25/2002	9:06:37	118.07	3.228	16.439	102.22	170.5	1.38
06/25/2002	9:07:37	117.8	3.254	16.436	103.07	170.2	1.41
06/25/2002	9:08:38	117.14	3.239	16.44	102.41	169.8	1.41
06/25/2002	9:09:38	117.07	3.246	16.425	100.63	170	1.42
06/25/2002	9:10:38	116.53	3.253	16.418	100.22	169.5	1.41
06/25/2002	9:11:38	116.45	3.231	16.433	100.31	169.5	1.39
06/25/2002	9:12:38	116.87	3.257	16.432	100.21	169.5	1.42
06/25/2002	9:13:38	117.35	3.236	16.435	107.4	169.5	1.39
06/25/2002	9:14:36	117.29	3.242	16.436	102.58	169.4	1.4
06/25/2002	9:15:36	116.32	3.257	16.437	103.31	169.5	1.39
06/25/2002	9:16:36	116.22	3.233	16.43	101.81	169.5	1.39
06/25/2002	9:17:36	115.61	3.257	16.426	101.55	169.5	1.4
06/25/2002	9:18:36	115.84	3.243	16.416	102.37	170.1	1.37
06/25/2002	9:19:36	116.29	3.253	16.417	100.44	171.3	1.39
06/25/2002	9:20:36	115.34	3.268	16.433	100.6	171.8	1.39
06/25/2002	9:21:36	115.48	3.247	16.427	100.38	172	1.4
06/25/2002	9:22:36	114.72	3.26	16.428	101.51	171.5	1.41
06/25/2002	9:23:36	115.25	3.255	16.428	102.13	171.5	1.39
06/25/2002	9:24:36	115.52	3.248	16.425	101.99	171.2	1.4
06/25/2002	9:25:36	115.88	3.27	16.42	101.48	170.7	1.37
06/25/2002	9:26:36	115.04	3.248	16.418	101.02	171.5	1.38
06/25/2002	9:27:36	114.66	3.266	16.42	102.51	170.5	1.4
06/25/2002	9:28:36	114.44	3.256	16.418	102.22	171.4	1.39
06/25/2002	9:29:37	113.64	3.257	16.423	101.46	171.5	1.39
	Average	117.6	3.2	16.4	102.3	170.5	1.4

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 10% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 3

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/25/2002	10:05:17	114.97	3.248	16.453	86.67	173	1.25
06/25/2002	10:06:17	115.39	3.231	16.453	89.02	173.1	1.25
06/25/2002	10:07:17	116.1	3.24	16.459	87.49	173.5	1.25
06/25/2002	10:08:17	116.32	3.238	16.457	89.91	173.1	1.24
06/25/2002	10:09:17	115.83	3.224	16.464	90.15	172.7	1.24
06/25/2002	10:10:17	116.13	3.246	16.46	89.85	173.5	1.27
06/25/2002	10:11:17	115.29	3.223	16.462	88.4	173.5	1.25
06/25/2002	10:12:17	115.56	3.251	16.443	88.98	172.9	1.26
06/25/2002	10:13:17	114.56	3.245	16.454	89.11	173.1	1.24
06/25/2002	10:14:17	113.73	3.23	16.461	89.61	173.1	1.24
06/25/2002	10:15:17	113.57	3.247	16.458	89.77	172.5	1.27
06/25/2002	10:16:17	113.59	3.219	16.461	89.51	172.5	1.25
06/25/2002	10:17:18	113.63	3.245	16.458	88.71	172.5	1.26
06/25/2002	10:18:18	113.83	3.233	16.459	88.84	172.5	1.24
06/25/2002	10:19:18	114.1	3.241	16.462	89.35	172.5	1.27
06/25/2002	10:20:18	114.42	3.25	16.451	89.39	171.8	1.26
06/25/2002	10:21:18	113.21	3.231	16.459	88.98	172.1	1.24
06/25/2002	10:22:18	112.97	3.257	16.449	88.4	172.5	1.24
06/25/2002	10:23:18	113.19	3.248	16.439	88.01	171.6	1.22
06/25/2002	10:24:18	112.02	3.259	16.444	87.45	172.3	1.21
06/25/2002	10:25:18	111.96	3.254	16.448	87.51	172.5	1.21
06/25/2002	10:26:18	112.92	3.235	16.457	93.22	172	1.32
06/25/2002	10:27:18	112.84	3.262	16.453	103.09	171.5	1.49
06/25/2002	10:28:18	113.48	3.239	16.429	103.78	171.5	1.75
06/25/2002	10:29:18	112.91	3.268	16.439	99.68	172	1.45
06/25/2002	10:30:18	112.5	3.255	16.447	100.1	172	1.46
06/25/2002	10:31:18	112.04	3.247	16.446	98.57	172.3	1.45
06/25/2002	10:32:18	112.66	3.263	16.446	97.39	171.5	1.44
06/25/2002	10:33:18	113.52	3.24	16.439	101.77	171.5	1.48
06/25/2002	10:34:18	112.93	3.266	16.447	99.91	171.5	1.44
06/25/2002	10:35:18	112.92	3.244	16.456	101.39	172.2	1.43
06/25/2002	10:36:18	113.09	3.242	16.46	102.08	171.5	1.45
06/25/2002	10:37:19	113.06	3.252	16.45	100.87	171.4	1.47
06/25/2002	10:38:19	112.34	3.238	16.435	99.77	171.3	1.45
06/25/2002	10:39:19	111.79	3.269	16.452	100.35	172	1.45
06/25/2002	10:40:19	112.38	3.244	16.443	98.54	172.1	1.42
06/25/2002	10:41:19	111.81	3.26	16.437	99.31	172	1.44
06/25/2002	10:42:17	112.24	3.267	16.437	98.37	172.5	1.42
06/25/2002	10:43:17	111.54	3.246	16.432	99.59	172.3	1.43
06/25/2002	10:44:17	111.12	3.266	16.438	100.15	172.1	1.43
06/25/2002	10:45:17	112.1	3.261	16.434	98.85	172.5	1.42
06/25/2002	10:46:17	111.79	3.257	16.433	100.14	172.5	1.43
06/25/2002	10:47:17	112.39	3.273	16.437	102.07	172.2	1.49
06/25/2002	10:48:17	111.42	3.234	16.449	100.72	172.5	1.42
06/25/2002	10:49:17	112.38	3.261	16.449	103.57	171.6	1.48
	Average	113.3	3.2	16.4	94.9	172.3	1.4

Data Summary

Run	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
Run 1	07:30-08:14	125.3	3.2	16.5	99.3	177.8	1.42
Run 2	08:45-09:29	117.6	3.2	16.4	102.3	170.5	1.41
Run 3	10:05-10:49	113.3	3.2	16.4	94.9	172.3	1.36

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 10% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO
Molecular Weight:	28.01

Run No.	Start-Stop Time	Raw Data (ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	07:30-08:14	125.3	149.4	0.4	148.5	126.00
2	08:45-09:29	117.6	149.4	0.4	148.0	118.65
3	10:05-10:49	113.3	149.4	0.3	148.0	114.30
				Average		119.65

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000

Mass Emission Rate (lb/1000 lb fuel)

E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 10% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO_2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	07:30-08:14	3.2	9.9	-0.2	10.1	3.31
2	08:45-09:29	3.2	9.9	-0.2	10.0	3.31
3	10:05-10:49	3.2	9.9	-0.1	10.0	3.28
					Average	3.30

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 10% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	O2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	07:30-08:14	16.5	20.0	0.0	20.0	16.51
2	08:45-09:29	16.4	20.0	0.0	19.9	16.52
3	10:05-10:49	16.4	20.0	0.0	19.9	16.53
					Average	16.52

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Total Hydrocarbon Data Correction

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 10% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	THC
Molecular Weight:	16.00

			Source Information		Corrected
Run No.	Start-Stop Time	Raw Data (ppm)	Stack Flow (dscfm)	Stack Moisture (%)	Data Dry Basis (ppm)
1	07:30-08:14	99.3	344	3.77	103.21
2	08:45-09:29	102.3	287	3.75	106.32
3	10:05-10:49	94.9	287	3.84	98.64
				Average	102.73

<u>Moisture Correction</u>

Cgas(dry)=Cgas(wet)/(1-(% moisture/100))

<u>Mass Emission Rate (lb/hr)</u>

E(lb/hr)=Cgas(dry)*MWgas*Qs(dscfm)*60/385300000

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 10% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	N0x
Molecular Weight:	46.01

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
			Cma	Co	Cm	
1	07:30-08:14	177.8	448.0	0.7	445.0	178.62
2	08:45-09:29	170.5	448.0	0.4	444.5	171.60
3	10:05-10:49	172.3	448.0	0.4	444.0	173.60
					Average	174.60

<u>Calibration Error Correction</u>
Cgas=(Cobs-Co)*(Cma/(Cm-Co))
<u>Mass Emission Rate (lb/hr)</u>
E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000
<u>Mass Emission Rate (lb/1000 lb fuel)</u>
E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

Date:	Run:	E-10-1			Horsepower:		18 14	
06/25/2002	Flow (dscfm):	343.6			Fuel Usage (gal/hr):		3.00	
	Moisture (%):	3.77						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	178.62	126.00	101 79	103.21	1.42	3.31	16.51
	Mass Rate (lb/hr)	0.44	0.19	0.09	8.78E-02	1.22E-03	0 01	0 03
	Mass Rate (lb/gal fuel)	0 15	0.06	0.03	0.03	0.00	0.00	0.01
	Mass Rate (gr/hp*hr)	11.01	4.73	2.17	2.20	0.03	0.20	0.71

Date:	Run:	E-10-2			Horsepower:		19.23	
06/25/2002	Flow (dscfm):	287.4			Fuel Usage (gal/hr):		3.69	
	Moisture (%):	3.75						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	171 60	118.65	104 91	106.32	1.41	3.31	16.52
	Mass Rate (lb/hr)	0.35	0.15	0.07	7.57E-02	1.01E-03	0.01	0.02
	Mass Rate (lb/gal fuel)	0.10	0.04	0.02	0.02	0.00	0.00	0.01
	Mass Rate (gr/hp*hr)	8.34	3.51	1.76	1.79	0.02	0.15	0.56

Date:	Run:	E-10-3			Horsepower:		16.84	
06/25/2002	Flow (dscfm):	286.8			Fuel Usage (gal/hr):		2 78	
	Moisture (%):	3.84						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	173.60	114.30	97.28	98.64	1.36	3.28	16.53
	Mass Rate (lb/hr)	0.36	0.14	0.07	7.00E-02	9.72E-04	0.01	0.02
	Mass Rate (lb/gal fuel)	0.13	0.05	0.02	0.03	0 00	0.00	0.01
	Mass Rate (gr/hp*hr)	9.62	3.85	1.86	1.89	0.03	0.17	0.64

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	25% Load - Generator 1
Date	06/25/2002
Run Number	1
Start Time	1125
Stop Time	1210

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.4	0.2	0.3	0.1	0.4	0.0	0.1	Co=0.4
CO Low	~30	30.1		29.5	-0.3						
CO Mid	~60	59.4		58.5	-0.4						
CO High	80-100 (2)	149.4		149	-0.2	148	-0.5	148	-0.5	0.0	Cm=148.0
CO2 Zero	0	0		-0.2	-0.8	-0.1	0.4	-0.1	0.4	0.0	-Co=0.1
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	10	0.0	10	0.0	0.0	Cm=10.0
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		-0.1	-0.4	0	0.4	0	0.4	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		19.9	-0.4	19.9	0.0	20	0.4	0.4	Cm=20.0
THC Zero	0	0		-0.2		6.6	2.3	6.8		0.1	
THC Low	25-35	49.6		48.4	-2.4						
THC Mid	45-55	124.6		121	-2.9	129	2.7	130		0.3	
THC High	80-90	298.6		297							
NOx Zero	0	0		0.4	0.0	0.4	0.0	0.4	0.0	0.0	Co=0.4
NOx Low	20-30 (3)										
NOx Mid	45-55	448		444	-0.4	444	0.0	443	-0.1	-0.1	Cm=443.5
NOx High	80-90	885.5		883	-0.3						

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	25% Load - Generator 1
Date	06/25/02
Run Number	2
Start Time	1245
Stop Time	1330

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	SYSTEM CAL CHECK PRETEST System Response	PRETEST Syst. Bias (% of Span)	POST TEST System Response	POST TEST Syst. Bias (% of Span)	POST TEST Drift (% of Span)	Calibration Correction Factors
CO Zero	0	0		0.4	0.2	0.4	0.0	0.4	0.0	0.0	Co=0.4
CO Low	~30	30.1		29.5	-0.3						
CO Mid	~60	59.4		58.5	-0.4						
CO High	80-100 (2)	149.4		149	-0.2	148	-0.5	148	-0.5	0.0	Cm=148.0
CO2 Zero	0	0		-0.2	-0.8	-0.1	0.4	-0.2	0.0	-0.4	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	10	0.0	10.1	0.4	0.4	Cm=10.1
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		-0.1	-0.4	0	0.4	0	0.4	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		19.9	-0.4	20	0.4	20	0.4	0.0	Cm=20.0
THC Zero	0	0		-0.2		6.8	2.3	6.1		-0.2	
THC Low	25-35	49.6		48.4	-2.4						
THC Mid	45-55	124.6		121	-2.9	130	3.0	126		-1.3	
THC High	80-90	298.6		297							
NOx Zero	0	0		0.4	0.0	0.4	0.0	0.4	0.0	0.0	Co=0.4
NOx Low	20-30 (3)										
NOx Mid	45-55	448		444	-0.4	443	-0.1	443	-0.1	0.0	Cm=443.0
NOx High	80-90	885.5		883	-0.3						

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	25% Load - Generator 1
Date	06/25/02
Run Number	3
Start Time	1400
Stop Time	1445

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.4	0.2	0.4	0.0	0.4	0.0	0.0	Co=0.4
CO Low	~30	30.1		29.5	-0.3						
CO Mid	~60	59.4		58.5	-0.4						
CO High	80-100 (2)	149.4		149	-0.2	148	-0.5	147	-1.0	-0.5	Cm=147.5
CO2 Zero	0	0		-0.2	-0.8	-0.2	0.0	-0.2	0.0	0.0	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	10.1	0.4	10.1	0.4	0.0	Cm=10.1
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		-0.1	-0.4	0	0.4	0	0.4	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		19.9	-0.4	20	0.4	20	0.4	0.0	Cm=20.0
THC Zero	0	0		-0.2		6.1	2.1	6.7		0.2	
THC Low	25-35	49.6		48.4	-2.4						
THC Mid	45-55	124.6		121	-2.9	126	1.7	126		0.0	
THC High	80-90	298.6		297							
NOx Zero	0	0		0.4	0.0	0.4	0.0	0.4	0.0	0.0	Co=0.4
NOx Low	20-30 (3)										
NOx Mid	45-55	448		444	-0.4	443	-0.1	442	-0.2	-0.1	Cm=442.5
NOx High	80-90	885.5		883	-0.3						

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 25% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 1

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/25/2002	11:25:38	104.2	4.116	15.185	88.42	197.5	1 13
06/25/2002	11:26:38	104.98	4.13	15.2	87.67	197.9	1 14
06/25/2002	11:27:38	103.93	4.13	15.189	87.08	197 7	1 13
06/25/2002	11:28:38	102.88	4.123	15.189	86.75	197.6	1 12
06/25/2002	11:29:38	102.88	4.143	15.189	87 18	197.6	1 12
06/25/2002	11:30:38	102.38	4.121	15.19	87.29	197.6	1 11
06/25/2002	11:31:38	102.77	4.141	15.184	87.92	197.6	1 11
06/25/2002	11:32:38	102.63	4.132	15.189	87.34	197.6	1 11
06/25/2002	11:33:38	102.22	4.128	15.188	85.31	197.5	1.09
06/25/2002	11:34:38	101.92	4.145	15.187	86.77	197.6	1.08
06/25/2002	11:35:38	101.66	4.127	15.189	85.83	197.6	1.09
06/25/2002	11:36:38	101.47	4.153	15.18	85.53	197.6	1.1
06/25/2002	11:37:39	101.36	4.138	15.188	86.54	198.4	1.09
06/25/2002	11:38:39	101.32	4.138	15.193	86.91	198.6	1.1
06/25/2002	11:39:39	101.5	4.143	15.192	85.71	197.6	1.09
06/25/2002	11:40:39	101 18	4.128	15.19	86.32	197 1	1.11
06/25/2002	11:41:39	101.36	4.155	15.195	86.05	196.6	1.1
06/25/2002	11:42:39	101.62	4.129	15.193	85.48	197 1	1.08
06/25/2002	11:43:39	101.06	4.138	15.202	86	196.1	1.1
06/25/2002	11:44:39	101 76	4.142	15.192	84.88	195.6	1.09
06/25/2002	11:45:39	101.25	4.131	15.195	84.13	196.6	1.06
06/25/2002	11:46:39	100.91	4.151	15.2	93.87	196.6	1.03
06/25/2002	11:47:39	101 16	4.124	15.2	86.54	195.7	1.07
06/25/2002	11:48:39	101.45	4.144	15.198	86.31	195.9	1.08
06/25/2002	11:49:39	101 73	4.138	15.189	85.36	196.6	1.08
06/25/2002	11:50:39	101.09	4.14	15.194	85.29	196.6	1.08
06/25/2002	11:51:39	101.24	4.153	15.197	86.18	196	1.08
06/25/2002	11:52:39	101.39	4.13	15.193	85.5	195.6	1.1
06/25/2002	11:53:39	100.78	4.154	15.2	83.72	196.3	1.08
06/25/2002	11:54:39	100.34	4.131	15.202	82.88	196.6	1.06
06/25/2002	11:55:39	101.05	4.138	15.2	82.7	196.5	1.07
06/25/2002	11:56:40	101.07	4.143	15.193	83.82	196.3	1.05
06/25/2002	11:57:40	101.4	4.13	15.203	83.51	195.8	1.06
06/25/2002	11:58:40	101 18	4.154	15.201	83.01	196.2	1.06
06/25/2002	11:59:37	101.22	4.137	15.196	83.73	195.6	1.05
06/25/2002	12:00:38	101.08	4.128	15.197	83.86	195.6	1.03
06/25/2002	12:01:38	101.23	4.15	15.194	84.27	194.6	1.08
06/25/2002	12:02:38	101.3	4.128	15.194	83.38	194.6	1.05
06/25/2002	12:03:38	101 12	4.158	15.184	82.98	195.4	1.07
06/25/2002	12:04:38	101 79	4.152	15.187	82.5	195.6	1.06
06/25/2002	12:05:38	101.48	4.145	15.197	87.37	195.6	1.05
06/25/2002	12:06:38	101.9	4.154	15.192	83.55	195.1	1.06
06/25/2002	12:07:38	101.59	4.132	15.19	85.11	195.2	1.07
06/25/2002	12:08:38	102.19	4.164	15.191	83.72	194.8	1.08
06/25/2002	12:09:38	102.04	4.142	15.196	84.62	195.6	1.08
	Average	101.7	4.1	15.2	85.5	196.5	1.1

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 25% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 2

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/25/2002	12:45:15	101.49	4.15	15.185	90.82	195.7	1 11
06/25/2002	12:46:15	100.52	4.13	15.186	90.77	195.9	1 11
06/25/2002	12:47:15	100.55	4.156	15.185	91.56	195.6	1 13
06/25/2002	12:48:13	101.14	4.139	15.175	89.37	195.6	1 13
06/25/2002	12:49:13	101.1	4.139	15.178	88.53	195.6	1 13
06/25/2002	12:50:13	101.07	4.161	15.168	88.07	195.9	1 12
06/25/2002	12:51:13	100.97	4.136	15.168	88	197	1 11
06/25/2002	12:52:13	100.94	4.158	15.172	88.56	197.5	1.12
06/25/2002	12:53:13	100.8	4.147	15.183	86.75	197	1.1
06/25/2002	12:54:14	100.9	4.138	15.187	88.64	196.5	1.06
06/25/2002	12:55:14	100.72	4.153	15.182	87.02	196.5	1.09
06/25/2002	12:56:14	100.27	4.13	15.189	87.2	197	1.08
06/25/2002	12:57:14	100.84	4.154	15.178	89.5	196.4	1.08
06/25/2002	12:58:14	101.18	4.143	15.175	88.98	195.6	1.09
06/25/2002	12:59:14	101.3	4.149	15.172	88.03	195.6	1 1
06/25/2002	13:00:14	100.87	4.155	15.185	87.58	194.6	1 1
06/25/2002	13:01:14	101.69	4.128	15.183	88.85	194.5	1.1
06/25/2002	13:02:14	107 17	4.156	15.18	94.18	194.9	1 13
06/25/2002	13:03:14	108.34	4.136	15.184	95.37	194.7	1 14
06/25/2002	13:04:14	109.14	4.141	15.199	91.66	196.6	1 13
06/25/2002	13:05:14	103.76	4.139	15.202	88.37	198.4	1.13
06/25/2002	13:06:14	101.3	4.122	15.192	86.28	199.4	1.1
06/25/2002	13:07:14	101 13	4.153	15.192	86.25	199.9	1 11
06/25/2002	13:08:14	100.63	4.116	15.193	85.86	201 1	1.07
06/25/2002	13:09:14	100.98	4.141	15.194	85.18	199.6	1 1
06/25/2002	13:10:14	100.53	4.132	15.2	85.15	199.2	1.1
06/25/2002	13:11:14	100.62	4.129	15.204	85.34	198.5	1.07
06/25/2002	13:12:14	99.88	4.134	15.212	84.3	198.5	1.08
06/25/2002	13:13:14	100.05	4.107	15.21	83.97	197.5	1.07
06/25/2002	13:14:15	99.53	4.13	15.21	84.66	197.5	1.06
06/25/2002	13:15:15	99.45	4.123	15.189	84.13	197 7	1.08
06/25/2002	13:16:15	98.88	4.123	15.221	82.67	198.5	1.08
06/25/2002	13:17:15	98.94	4.127	15.199	83.71	198	1 13
06/25/2002	13:18:15	99.54	4.117	15.193	82.85	197.8	1.09
06/25/2002	13:19:15	98.68	4.143	15.201	84.91	198.5	1.11
06/25/2002	13:20:15	98.6	4.112	15.21	83.76	198	1.1
06/25/2002	13:21:15	99.43	4.124	15.213	83.53	197.5	1 11
06/25/2002	13:22:15	99.13	4.123	15.217	84.2	197.5	1 12
06/25/2002	13:23:15	98.97	4.109	15.22	82.48	196.8	1.09
06/25/2002	13:24:15	98.56	4.12	15.231	82.08	196.5	1.09
06/25/2002	13:25:15	98.65	4.091	15.229	82.02	195.7	1 1
06/25/2002	13:26:15	99.1	4.115	15.23	81.55	195.5	1.1
06/25/2002	13:27:15	98.33	4.104	15.23	81.21	195.3	1.09
06/25/2002	13:28:15	98.42	4.106	15.224	81 12	194.5	1.09
06/25/2002	13:29:15	98.87	4.118	15.224	82.04	194.5	1 12
	Average	100.7	4.1	15.2	86.4	196.9	1.1

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 25% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 3		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/25/2002	14:01:11	97 79	4.132	15.164	77 73	194.7	1.03
06/25/2002	14:02:11	98.14	4.157	15.178	78.84	195.4	1.06
06/25/2002	14:03:11	98.09	4.133	15.16	79.42	194.5	1.06
06/25/2002	14:04:11	98.19	4.158	15.189	78.95	195.7	1.07
06/25/2002	14:05:11	97.08	4.126	15.192	79.38	196	1.05
06/25/2002	14:06:11	97.92	4.136	15.184	79.78	194.5	1.07
06/25/2002	14:07:11	97.49	4.139	15.198	81 11	195.4	1.07
06/25/2002	14:08:11	98.48	4.117	15.207	80.58	194.6	1.07
06/25/2002	14:09:11	97.92	4.13	15.218	79.79	195.4	1.09
06/25/2002	14:10:11	97.96	4.107	15.217	79.17	194.6	1.08
06/25/2002	14:11:11	97.95	4.123	15.204	80.11	194.6	1.06
06/25/2002	14:12:11	97 72	4.125	15.201	80.38	194.9	1.08
06/25/2002	14:13:11	98.89	4.124	15.193	80.52	194.1	1.06
06/25/2002	14:14:11	98.84	4.144	15.195	80.38	195.6	1.06
06/25/2002	14:15:11	97.85	4.109	15.218	79.72	195.6	1.04
06/25/2002	14:16:11	97.92	4.12	15.226	80.14	194.7	1.05
06/25/2002	14:17:11	97.89	4.109	15.226	80.28	194.6	1.06
06/25/2002	14:18:11	98.49	4.105	15.207	80.23	194	1.05
06/25/2002	14:19:12	98.79	4.132	15.194	78.97	193.9	1.05
06/25/2002	14:20:12	98.59	4.111	15.207	79.34	194.6	1.04
06/25/2002	14:21:12	98.99	4.136	15.18	79.96	194.2	1.05
06/25/2002	14:22:12	98.56	4.134	15.187	79.09	194.8	1.02
06/25/2002	14:23:12	97 72	4.122	15.215	79.24	195.7	1.04
06/25/2002	14:24:12	97.52	4.123	15.217	78.82	194.2	1.03
06/25/2002	14:25:12	98.14	4.101	15.22	80.53	193.3	1.04
06/25/2002	14:26:12	98.49	4.123	15.22	78.87	192.6	1.06
06/25/2002	14:27:12	98.57	4.103	15.217	78.55	192.6	1.04
06/25/2002	14:28:10	98.67	4.115	15.211	78.78	192	1.03
06/25/2002	14:29:10	98.52	4.128	15.215	81	191.6	1.05
06/25/2002	14:30:10	103.62	4.107	15.203	82.31	192.2	1.06
06/25/2002	14:31:10	101 11	4.124	15.222	79.22	192.9	1.05
06/25/2002	14:32:10	99.26	4.108	15.219	79.16	194	1.03
06/25/2002	14:33:10	99.2	4.106	15.236	78.08	196.1	1.05
06/25/2002	14:34:10	97.97	4.111	15.243	76.78	196.6	1.04
06/25/2002	14:35:10	97 79	4.086	15.234	75.88	195.8	1.04
06/25/2002	14:36:10	97.89	4.117	15.211	76.48	196.2	1.05
06/25/2002	14:37:10	98.55	4.12	15.197	76.7	196.3	1.03
06/25/2002	14:38:10	98.21	4.125	15.207	76.47	198.1	1.05
06/25/2002	14:39:10	98.26	4.133	15.192	76.52	197.6	1.04
06/25/2002	14:40:10	97.5	4.122	15.194	76.39	198.1	1.05
06/25/2002	14:41:11	97.47	4.151	15.184	76.4	198.6	1.03
06/25/2002	14:42:11	96.99	4.133	15.183	78.72	198.6	1.07
06/25/2002	14:43:11	97.21	4.139	15.204	80.95	198.6	1 12
06/25/2002	14:44:11	97.25	4.131	15.202	80	198.2	1.09
06/25/2002	14:45:11	97 15	4.119	15.203	79.93	198.1	1 1
06/25/2002	14:46:11	97.26	4.143	15.202	79.23	197.6	1 1
	Average	98.3	4.1	15.2	79.1	195.3	1.1

Data Summary		CO	CO2	O2	THC	NOx	Methane
Run	Time	ppm	%	%	ppm	ppm	ppm
Run 1	11:25-12:09	101 7	4.1	15.2	85.5	196.5	1.08
Run 2	12:45-13:29	100.7	4.1	15.2	86.4	196.9	1 10
Run 3	14:01-14:46	98.3	4.1	15.2	79.1	195.3	1.06

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 25% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO
Molecular Weight:	28.01

Run No.	Start-Stop Time	Raw Data (ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	11:25-12:09	101.7	149.4	0.4	148.0	102.59
2	12:45-13:29	100.7	149.4	0.4	148.0	101.56
3	14:01-14:46	98.3	149.4	0.4	147.5	99.39
					Average	101.18

<u>Calibration Error Correction</u>
Cgas=(Cobs-Co)*(Cma/(Cm-Co))
<u>Mass Emission Rate (lb/hr)</u>
E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000
<u>Mass Emission Rate (lb/1000 lb fuel)</u>
E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 25% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
			Cma	Co	Cm	
1	11:25-12:09	4.1	9.9	-0.1	10.0	4.15
2	12:45-13:29	4.1	9.9	-0.2	10.1	4.16
3	14:01-14:46	4.1	9.9	-0.2	10.1	4.16
				Average		4.16

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 25% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	O2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	11:25-12:09	15.2	20.0	0.0	20.0	15.23
2	12:45-13:29	15.2	20.0	0.0	20.0	15.20
3	14:01-14:46	15.2	20.0	0.0	20.0	15.20
					Average	15.21

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Total Hydrocarbon Data Correction

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 25% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	THC
Molecular Weight:	16.00

			Source Information		Corrected
Run No.	Start-Stop Time	Raw Data (ppm)	Stack Flow (dscfm)	Stack Moisture (%)	Data Dry Basis (ppm)
1	11:25-12:09	85.5	320	5.31	90.33
2	12:45-13:29	86.4	321	4.31	90.27
3	14:01-14:46	79.1	321	4.07	82.47
				Average	87.69

Moisture Correction

Cgas(dry)=Cgas(wet)/(1-(% moisture/100))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas(dry)*MWgas*Qs(dscfm)*60/385300000

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 25% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	N0x
Molecular Weight:	46.01

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
			Cma	Co	Cm	
1	11:25-12:09	196.5	448.0	0.4	443.5	198.29
2	12:45-13:29	196.9	448.0	0.4	443.0	198.90
3	14:01-14:46	195.3	448.0	0.4	442.5	197.46
					Average	198.22

Calibration Error Correction
Cgas=(Cobs-Co)*(Cma/(Cm-Co))
Mass Emission Rate (lb/hr)
E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000
Mass Emission Rate (lb/1000 lb fuel)
E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

Date: 06/25/2002 **Run:** E-25-1
Flow (dscfm): 319.7
Moisture (%): 5.31
Horsepower: 42.84
Fuel Usage (gal/hr): 3.75

Pollutant:	**NOx**	**CO**	**NMHC**	**THC**	**Methane**	**CO2**	**O2**
Concentration (ppm or %)	198.29	102.59	89.25	90.33	1.08	4.15	15.23
Mass Rate (lb/hr)	0.45	0.14	0.07	7.15E-02	8.60E-04	0.01	0.02
Mass Rate (lb/gal fuel)	0.12	0.04	0.02	0.02	0.00	0.00	0.01
Mass Rate (gr/hp*hr)	4.81	1.52	0.75	0.76	0.01	0.10	0.26

Date: 06/25/2002 **Run:** E-25-2
Flow (dscfm): 321.1
Moisture (%): 4.31
Horsepower: 42.18
Fuel Usage (gal/hr): 3.69

Pollutant:	**NOx**	**CO**	**NMHC**	**THC**	**Methane**	**CO2**	**O2**
Concentration (ppm or %)	198.90	101.56	89.17	90.27	1.10	4.16	15.20
Mass Rate (lb/hr)	0.46	0.14	0.07	7.18E-02	8.80E-04	0.01	0.02
Mass Rate (lb/gal fuel)	0.12	0.04	0.02	0.02	0.00	0.00	0.01
Mass Rate (gr/hp*hr)	4.92	1.53	0.76	0.77	0.01	0.10	0.26

Date: 06/25/2002 **Run:** E-25-3
Flow (dscfm): 321.1
Moisture (%): 4.07
Horsepower: 42.26
Fuel Usage (gal/hr): 3.70

Pollutant:	**NOx**	**CO**	**NMHC**	**THC**	**Methane**	**CO2**	**O2**
Concentration (ppm or %)	197.46	99.39	81.41	82.47	1.06	4.16	15.20
Mass Rate (lb/hr)	0.45	0.14	0.06	6.56E-02	8.48E-04	0.01	0.02
Mass Rate (lb/gal fuel)	0.12	0.04	0.02	0.02	0.00	0.00	0.01
Mass Rate (gr/hp*hr)	4.88	1.49	0.70	0.70	0.01	0.10	0.26

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	50% Load - Generator 1
Date	06/25/2002
Run Number	1
Start Time	1520
Stop Time	1605

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration
	Gas					PRETEST		POST TEST			Correction
	Specification (% of Span)	Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	Factors
CO Zero	0	0		0.4	0.2	0.4	0.0	0.2	-0.1	-0.1	Co=0.3
CO Low	~30	30.1		29.5	-0.3						
CO Mid	~60	59.4		58.5	-0.4						
CO High	80-100 (2)	149.4		149	-0.2	147	-1.0	147	-1.0	0.0	Cm=147.0
CO2 Zero	0	0		-0.2	-0.8	-0.2	0.0	-0.1	0.4	0.4	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	10.1	0.4	9.9	-0.4	-0.8	Cm=10.0
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		-0.1	-0.4	0	0.4	0	0.4	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		19.9	-0.4	20	0.4	19.9	0.0	-0.4	Cm=20.0
THC Zero	0	0		-0.2		6.7	2.3	5.9		-0.3	
THC Low	25-35	49.6		48.4	-2.4						
THC Mid	45-55	124.6		121	-2.9	126	1.7	129		1.0	
THC High	80-90	298.6		297							
NOx Zero	0	0		0.4	0.0	0.4	0.0	0.4	0.0	0.0	Co=0.4
NOx Low	20-30 (3)										
NOx Mid	45-55	448		444	-0.4	442	-0.2	441	-0.3	-0.1	Cm=441.5
NOx High	80-90	885.5		883	-0.3						

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	50% Load - Generator 1
Date	06/25/02
Run Number	2
Start Time	1642
Stop Time	1727

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	SYSTEM CAL CHECK PRETEST System Response	Syst. Bias (% of Span)	POST TEST System Response	Syst. Bias (% of Span)	Drift (% of Span)	Calibration Correction Factors
CO Zero	0	0		0.4	0.2	0.2	0.1	0.3	-0.1	0.1	Co=0.3
CO Low	~30	30.1		29.5	-0.3						
CO Mid	~60	59.4		58.5	-0.4						
CO High	80-100 (2)	149.4		149	-0.2	147	-1.0	147	-1.0	0.0	Cm=147.0
CO2 Zero	0	0		-0.2	-0.8	-0.1	0.4	-0.2	0.0	-0.4	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	9.9	-0.4	9.9	-0.4	0.0	Cm=9.9
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		-0.1	-0.4	0	0.4	0	0.4	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		19.9	-0.4	19.9	0.0	19.9	0.0	0.0	Cm=19.9
THC Zero	0	0		-0.2		5.9	2.0	5.8		0.0	
THC Low	25-35	49.6		48.4	-2.4						
THC Mid	45-55	124.6		121	-2.9	129	2.7	131		0.7	
THC High	80-90	298.6		297							
NOx Zero	0	0		0.4	0.0	0.4	0.0	0.4	0.0	0.0	Co=0.4
NOx Low	20-30 (3)										
NOx Mid	45-55	448		444	-0.4	441	-0.3	441	-0.3	0.0	Cm=441.0
NOx High	80-90	885.5		883	-0.3						

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	50% Load - Generator 1
Date	06/25/02
Run Number	3
Start Time	1800
Stop Time	1845

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
		Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.4	0.2	0.3	0.1	0.2	-0.1	-0.1	Co=0.3
CO Low	~30	30.1		29.5	-0.3						
CO Mid	~60	59.4		58.5	-0.4						
CO High	80-100 (2)	149.4		149	-0.2	147	-1.0	145	-2.0	-1.0	Cm=146.0
CO2 Zero	0	0		-0.2	-0.8	-0.2	0.0	-0.2	0.0	0.0	-Co=0.2
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	9.9	-0.4	10	0.0	0.4	Cm=10.0
CO2 High	80-100	20.5		20.4	-0.4						
O2 Zero	0	0		-0.1	-0.4	0	0.4	0	0.4	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		19.9	-0.4	19.9	0.0	20	0.4	0.4	Cm=20.0
THC Zero	0	0		-0.2		5.8	2.0	5.1		-0.2	
THC Low	25-35	49.6		48.4	-2.4						
THC Mid	45-55	124.6		121	-2.9	131	3.3	129		-0.7	
THC High	80-90	298.6		297							
NOx Zero	0	0		0.4	0.0	0.4	0.0	0.4	0.0	0.0	Co=0.4
NOx Low	20-30 (3)										
NOx Mid	45-55	448		444	-0.4	441	-0.3	443	-0.1	0.2	Cm=442.0
NOx High	80-90	885.5		883	-0.3						

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 50% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 1

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/25/2002	15:20:46	111 79	5.764	12.976	73.74	296.1	0.8
06/25/2002	15:21:46	110.76	5.743	13.01	73.2	296.6	0.81
06/25/2002	15:22:46	112.05	5.74	12.96	72.7	294	0.79
06/25/2002	15:23:46	113.62	5.77	12.911	72.17	294.3	0.78
06/25/2002	15:24:44	115.55	5.79	12.908	72.96	296.4	0.75
06/25/2002	15:25:44	115.78	5.811	12.936	73.01	296.6	0.78
06/25/2002	15:26:44	114.02	5.793	12.955	73.34	298	0.76
06/25/2002	15:27:44	112.79	5.763	12.958	72.79	296.6	0.75
06/25/2002	15:28:44	113.82	5.796	12.897	72.33	296	0.72
06/25/2002	15:29:44	114.6	5.799	12.889	73.95	297.4	0.76
06/25/2002	15:30:44	113.91	5.822	12.923	72.25	297.2	0.73
06/25/2002	15:31:44	112.89	5.798	12.926	72.63	297.9	0.75
06/25/2002	15:32:44	113.47	5.794	12.858	73.03	297.3	0.74
06/25/2002	15:33:44	114.99	5.849	12.889	70.8	300.4	0.73
06/25/2002	15:34:44	113.04	5.807	12.918	71.07	300.8	0.73
06/25/2002	15:35:44	113.74	5.816	12.878	71.8	297	0.75
06/25/2002	15:36:44	115.46	5.811	12.837	69.25	297 7	0.72
06/25/2002	15:37:44	116.71	5.845	12.817	67.9	302.4	0.7
06/25/2002	15:38:44	116.54	5.877	12.84	69.35	305.6	0.7
06/25/2002	15:39:44	113.26	5.846	12.909	72.86	305	0.68
06/25/2002	15:40:44	113.21	5.841	12.837	75.92	301.3	0.72
06/25/2002	15:41:45	115.35	5.841	12.859	73.82	303.7	0.72
06/25/2002	15:42:45	112.44	5.856	12.927	72.92	303.4	0.73
06/25/2002	15:43:45	111 73	5.824	12.921	70.45	300.6	0.71
06/25/2002	15:44:45	111 72	5.8	12.928	68.55	300.1	0.7
06/25/2002	15:45:45	110.24	5.811	12.925	71.27	298.4	0.72
06/25/2002	15:46:45	109.3	5.775	12.963	69.99	296.8	0.69
06/25/2002	15:47:45	110.54	5.791	12.938	69.76	297.5	0.68
06/25/2002	15:48:45	108.93	5.782	12.952	72.99	297.4	0.73
06/25/2002	15:49:45	110.41	5.77	12.968	71 11	296.6	0.73
06/25/2002	15:50:45	108.19	5.777	12.99	71.01	297.4	0.68
06/25/2002	15:51:45	110.18	5.748	12.943	71.42	295.4	0.7
06/25/2002	15:52:45	111.41	5.764	12.925	80.32	296.2	0.74
06/25/2002	15:53:45	126.95	5.753	12.844	76.34	298	0.73
06/25/2002	15:54:45	123.32	5.751	12.831	73.09	300.4	0.69
06/25/2002	15:55:45	116.47	5.759	12.912	67.4	304.1	0.67
06/25/2002	15:56:45	111.32	5.751	12.849	69.11	302.4	0.7
06/25/2002	15:57:45	113.01	5.777	12.846	66.4	302.1	0.68
06/25/2002	15:58:45	111 19	5.781	12.905	66.96	302.1	0.68
06/25/2002	15:59:45	109.86	5.804	12.91	68.08	300.9	0.71
06/25/2002	16:00:46	108.51	5.803	12.9	68.35	300.9	0.67
06/25/2002	16:01:46	113.7	5.779	12.83	67.73	300	0.66
06/25/2002	16:02:46	112.55	5.799	12.886	66.1	303.5	0.67
06/25/2002	16:03:46	110.01	5.787	12.922	65.8	303	0.64
06/25/2002	16:04:46	110.4	5.806	12.93	67.36	300.7	0.63
	Average	113.1	5.8	12.9	71.2	299.3	0.7

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 50% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 2		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/25/2002	16:42:59	116.34	5.841	12.852	81.04	309	0.85
06/25/2002	16:43:59	114.9	5.859	12.829	82.1	306.6	0.86
06/25/2002	16:44:59	116.72	5.861	12.822	80.33	307.4	0.83
06/25/2002	16:45:59	115.05	5.85	12.879	77.63	308.1	0.83
06/25/2002	16:46:59	109.81	5.769	12.934	76.56	307.6	0.8
06/25/2002	16:47:59	109.62	5.792	12.914	77.4	304.9	0.79
06/25/2002	16:48:59	112	5.803	12.908	78.66	302.6	0.82
06/25/2002	16:49:59	113.11	5.846	12.815	76.52	303.1	0.91
06/25/2002	16:50:59	117 72	5.96	12.698	75.49	303.2	0.8
06/25/2002	16:51:59	116.29	5.87	12.81	74.23	308.1	0.77
06/25/2002	16:52:59	113.6	5.891	12.795	74.21	310.1	0.78
06/25/2002	16:53:59	114.23	5.859	12.834	73.04	309.9	0.78
06/25/2002	16:54:59	109.31	5.804	12.9	73.26	309.1	0.77
06/25/2002	16:55:59	107.94	5.806	12.91	74.3	305.8	0.79
06/25/2002	16:57:00	107.27	5.804	12.878	74.35	304.1	0.8
06/25/2002	16:58:00	110.45	5.875	12.819	73.48	305.3	0.8
06/25/2002	16:59:00	111.89	5.846	12.843	72.42	307 1	0.77
06/25/2002	17:00:00	108.29	5.838	12.853	71.82	306.9	0.75
06/25/2002	17:01:00	110.36	5.874	12.811	72.24	304.8	0.77
06/25/2002	17:02:00	112.12	5.897	12.754	72.58	307.3	0.77
06/25/2002	17:03:00	114.24	5.893	12.803	72.11	309.1	0.79
06/25/2002	17:04:00	113.29	5.889	12.768	71.52	309.1	0.77
06/25/2002	17:05:00	113.37	5.891	12.79	72.3	309.1	0.76
06/25/2002	17:06:00	112.06	5.853	12.838	71 75	309.6	0.75
06/25/2002	17:06:58	110.12	5.826	12.862	72.23	308.3	0.71
06/25/2002	17:07:58	110.76	5.824	12.883	72.75	307.5	0.72
06/25/2002	17:08:58	108.31	5.821	12.877	71.41	305.8	0.76
06/25/2002	17:09:58	109.57	5.85	12.836	70.26	305.6	0.75
06/25/2002	17:10:58	110.96	5.852	12.841	70.71	306.1	0.74
06/25/2002	17:11:58	112.06	5.874	12.79	69.8	306.6	0.72
06/25/2002	17:12:58	110.79	5.894	12.801	68.57	308	0.73
06/25/2002	17:13:58	109.07	5.83	12.861	67.81	308.6	0.72
06/25/2002	17:14:58	107.82	5.852	12.844	72.53	306.5	0.71
06/25/2002	17:15:58	109.37	5.869	12.819	72.44	305.6	0.76
06/25/2002	17:16:58	109.55	5.853	12.821	71 14	305.6	0.76
06/25/2002	17:17:58	111 17	5.894	12.798	71.58	305.8	0.76
06/25/2002	17:18:58	110.27	5.841	12.845	70.25	306.5	0.76
06/25/2002	17:19:59	108.18	5.865	12.824	69.66	304.6	0.76
06/25/2002	17:20:59	110.38	5.907	12.745	71.3	302.8	0.73
06/25/2002	17:21:59	112.36	5.922	12.728	72.76	305.3	0.75
06/25/2002	17:22:59	111.97	5.881	12.817	70.36	307.3	0.76
06/25/2002	17:23:59	110.17	5.89	12.748	70.34	307.5	0.74
06/25/2002	17:24:59	113.76	5.931	12.73	70.82	303.6	0.78
06/25/2002	17:25:59	114.13	5.96	12.675	70.36	304.5	0.76
06/25/2002	17:26:59	113.81	5.907	12.749	70.53	309.2	0.74
	Average	111.7	5.9	12.8	73.0	306.8	0.8

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 50% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 3

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/25/2002	18:01:45	113.44	5.861	12.803	56.3	310.7	0.46
06/25/2002	18:02:45	114.58	5.957	12.652	56.39	309.8	0.45
06/25/2002	18:03:45	119.6	6.007	12.604	57 77	310.7	0.48
06/25/2002	18:04:46	123.08	6.083	12.527	57.08	314.4	0.52
06/25/2002	18:05:43	123.1	6.044	12.561	55.52	318.5	0.48
06/25/2002	18:06:43	121.39	6.035	12.58	54.75	320.8	0.47
06/25/2002	18:07:44	119.55	5.976	12.656	54.19	319.5	0.45
06/25/2002	18:08:44	119.73	6.007	12.601	54.8	317.5	0.47
06/25/2002	18:09:44	121.03	6.045	12.582	54.1	316.5	0.5
06/25/2002	18:10:44	121.89	6.023	12.588	53.66	318.5	0.45
06/25/2002	18:11:44	121.67	6.043	12.577	53.22	319.6	0.45
06/25/2002	18:12:44	118.76	5.948	12.694	52.65	320.4	0.46
06/25/2002	18:13:44	113.12	5.938	12.714	64.57	319.2	0.67
06/25/2002	18:14:44	113.89	5.98	12.668	64.77	315	0.84
06/25/2002	18:15:44	116.65	6.009	12.628	64.68	316.7	0.66
06/25/2002	18:16:44	115.45	5.975	12.706	63.95	316.8	0.67
06/25/2002	18:17:44	115.6	6.028	12.575	64.06	316.9	0.65
06/25/2002	18:18:44	119.46	6.037	12.635	63.98	315.6	0.65
06/25/2002	18:19:44	114.54	5.938	12.756	63.2	318.4	0.66
06/25/2002	18:20:44	114.51	5.968	12.643	62.58	314.7	0.64
06/25/2002	18:21:44	113.57	5.922	12.785	62.78	316.1	0.65
06/25/2002	18:22:44	111.65	5.954	12.673	64.43	314.2	0.62
06/25/2002	18:23:44	112.93	5.931	12.759	63.11	314.1	0.64
06/25/2002	18:24:44	111.8	5.954	12.703	62.3	314.3	0.66
06/25/2002	18:25:44	115.76	6.003	12.609	63.51	314.4	0.69
06/25/2002	18:26:45	119.35	6.068	12.593	63.65	317.3	0.69
06/25/2002	18:27:45	119.09	6.034	12.582	61 77	319.4	0.64
06/25/2002	18:28:45	120.73	6.078	12.576	60.83	318.8	0.64
06/25/2002	18:29:45	115.7	5.936	12.753	60.71	321.6	0.64
06/25/2002	18:30:45	111.46	5.93	12.715	61.22	318.3	0.63
06/25/2002	18:31:45	112.7	5.956	12.728	62.38	316.8	0.6
06/25/2002	18:32:45	112.21	5.919	12.743	62.76	316.6	0.6
06/25/2002	18:33:45	112.51	5.925	12.742	62.84	315.8	0.64
06/25/2002	18:34:45	113.48	5.94	12.713	63.01	314.7	0.64
06/25/2002	18:35:45	113.28	5.939	12.703	62.65	316.6	0.63
06/25/2002	18:36:45	116.79	6.033	12.641	62.42	314.6	0.63
06/25/2002	18:37:45	114.57	5.907	12.778	62.62	317 7	0.63
06/25/2002	18:38:45	112.37	5.919	12.757	62.68	315.6	0.64
06/25/2002	18:39:45	116.81	5.997	12.618	62.77	312.7	0.63
06/25/2002	18:40:45	120.13	5.992	12.683	61.81	314.7	0.63
06/25/2002	18:41:45	114.44	5.934	12.739	62.43	317.6	0.64
06/25/2002	18:42:45	115.71	5.971	12.642	62.97	315	0.66
06/25/2002	18:43:45	118.17	5.976	12.721	62.49	316.1	0.65
06/25/2002	18:44:45	112.69	5.903	12.763	62.2	316.5	0.63
06/25/2002	18:45:46	114.1	5.934	12.713	62.5	313.6	0.63
	Average	116.3	6.0	12.7	60.8	316.3	0.6

Data Summary

Run	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
Run 1	15:20-16:04	113.1	5.8	12.9	71.2	299.3	0.72
Run 2	16:42-17:26	111 7	5.9	12.8	73.0	306.6	0.77
Run 3	18:01-18:45	116.3	6.0	12.7	60.8	316.3	0.60

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 50% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO
Molecular Weight:	28.01

Run No.	Start-Stop Time	Raw Data (ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	15:20-16:04	113.1	149.4	0.3	147.0	114.88
2	16:42-17:26	111.7	149.4	0.3	147.0	113.42
3	18:01-18:45	116.3	149.4	0.3	146.0	118.95
				Average		115.75

Calibration Error Correction
Cgas=(Cobs-Co)*(Cma/(Cm-Co))
Mass Emission Rate (lb/hr)
E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000
Mass Emission Rate (lb/1000 lb fuel)
E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 50% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	15:20-16:04	5.79	9.9	-0.2	10.0	5.8
2	16:42-17:26	5.86	9.9	-0.2	9.9	5.9
3	18:01-18:45	5.98	9.9	-0.2	10.0	6.0
					Average	5.9

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 50% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	O2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	15:20-16:04	12.9	20.0	0.0	20.0	12.94
2	16:42-17:26	12.8	20.0	0.0	19.9	12.89
3	18:01-18:45	12.7	20.0	0.0	20.0	12.70
					Average	12.8

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Total Hydrocarbon Data Correction

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 50% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	THC
Molecular Weight:	16.00

			Source Information		Corrected
Run No.	Start-Stop Time	Raw Data (ppm)	Stack Flow (dscfm)	Stack Moisture (%)	Data Dry Basis (ppm)
1	15:20-16:04	71.2	368	5.42	75.27
2	16:42-17:26	73.0	316	5.54	77.33
3	18:01-18:45	60.8	315	5.37	64.23
				Average	72.28

Moisture Correction

Cgas(dry)=Cgas(wet)/(1-(% moisture/100))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas(dry)*MWgas*Qs(dscfm)*60/385300000

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 50% Load
Date:	06/25/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	N0x
Molecular Weight:	46.01

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	15:20-16:04	299.3	448.0	0.4	441.5	303.57
2	16:42-17:26	306.6	448.0	0.4	441.0	311.39
3	18:01-18:45	316.3	448.0	0.4	442.0	320.47
					Average	311.81

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000

Mass Emission Rate (lb/1000 lb fuel)

E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

Date:	Run:	E-50-1				Horsepower:	85.21	
06/25/2002	Flow (dscfm):	368.3				Fuel Usage (gal/hr):	5.52	
	Moisture (%):	5.42						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	303.57	114.88	74.55	75.27	0.72	5.79	12.94
	Mass Rate (lb/hr)	0.80	0.18	0.07	6.86E-02	6.61E-04	0.01	0.02
	Mass Rate (lb/gal fuel)	0.15	0.03	0.01	0.01	0.00	0.00	0.00
	Mass Rate (gr/hp*hr)	4.27	0.98	0.36	0.37	0.00	0.08	0.13

Date:	Run:	E-50-2				Horsepower:	86 01	
06/25/2002	Flow (dscfm):	315.8				Fuel Usage (gal/hr):	5.57	
	Moisture (%):	5.54						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	311.39	113.42	76.56	77.33	0.77	5.86	12.89
	Mass Rate (lb/hr)	0.70	0.16	0 06	6.05E-02	6.06E-04	0.01	0.02
	Mass Rate (lb/gal fuel)	0.13	0.03	0.01	0.01	0.00	0.00	0.00
	Mass Rate (gr/hp*hr)	3.72	0.82	0.32	0.32	0.00	0.07	0.11

Date:	Run:	E-50-3				Horsepower:	90.64	
06/25/2002	Flow (dscfm):	315.1				Fuel Usage (gal/hr):	5.87	
	Moisture (%):	5 37						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	320.47	118.95	63.63	64.23	0.60	5.98	12.70
	Mass Rate (lb/hr)	0.72	0.16	0.05	5 01E-02	4.71E-04	0.01	0.02
	Mass Rate (lb/gal fuel)	0.12	0.03	0.01	0.01	0.00	0.00	0.00
	Mass Rate (gr/hp*hr)	3.62	0.82	0.25	0.25	0.00	0.06	0.10

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	75% Load - Generator 1
Date	06/26/2002
Run Number	1
Start Time	1033
Stop Time	1118

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	SYSTEM CAL CHECK PRETEST System Response	PRETEST Syst. Bias (% of Span)	POST TEST System Response	POST TEST Syst. Bias (% of Span)	POST TEST Drift (% of Span)	Calibration Correction Factors
CO Zero	0	0		0.4	0.2	0.6	-0.1	0.3	-0.1	-0.2	Co=0.5
CO Low	~30	30.1									
CO Mid	~60	59.4									
CO High	80-100 (2)	149.4		149	-0.2	154	2.5	155	3.0	0.5	Cm=154.5
CO2 Zero	0	0		-0.3	-1.2	-0.3	0.0	-0.4	-0.4	-0.4	-Co=0.4
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	10	0.0	9.8	-0.8	-0.8	Cm=9.9
CO2 High	80-100	20.5		20.2	-1.2						
O2 Zero	0	0		-0.2	-0.8	-0.2	0.0	-0.3	-0.4	-0.4	-Co=0.3
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		19.9	-0.4	19.9	0.0	19.7	-0.8	-0.8	Cm=19.8
THC Zero	0	0		-0.5		-1.3	-0.3	5		2.1	
THC Low	25-35	49.6		50	0.8	50	0.0	53.1		1.0	
THC Mid	45-55	124.6		127	1.9	127	0.0				
THC High	80-90	298.6		297		297	0.0				
NOx Zero	0	0									
NOx Low	20-30 (3)										
NOx Mid	45-55	448									
NOx High	80-90	885.5									

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	75% Load - Generator 1
Date	06/27/02
Run Number	2
Start Time	1522
Stop Time	1607

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
	Specification (% of Span)	Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.6	0.3	0.6	0.0	0.6	0.0	0.0	Co=0.6
CO Low	~30	30.1		30	-0.1						
CO Mid	~60	59.4		59	-0.2						
CO High	80-100 (2)	149.4		149	-0.2	147	-1.0	147	-1.0	0.0	Cm=147.0
CO2 Zero	0	0		-0.1	-0.4	0.1	0.8	0	0.4	-0.4	Co=0.1
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	9.7	-1.2	9.8	-0.8	0.4	Cm=9.8
CO2 High	80-100	20.5		20.5	0.0						
O2 Zero	0	0		-0.1	-0.4	0	0.4	0	0.4	0.0	Co=0.0
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		20	0.0	20	0.0	19.8	-0.8	-0.8	Cm=19.9
THC Zero	0	0		0.3		3.8	1.2	4.3		0.2	
THC Low	25-35	49.6		49.6	0.0	47.1	-0.8	46.4		-0.2	
THC Mid	45-55	124.6		123	-1.3						
THC High	80-90	298.6		298							
NOx Zero	0	0		-0.1	0.0	5	0.5	10	1.0	0.5	Co=7.5
NOx Low	20-30 (3)										
NOx Mid	45-55	448		448	0.0	459	1.1	463	1.5	0.4	Cm=461.0
NOx High	80-90	885.5		885	-0.1						

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	75% Load - Generator 1
Date	06/27/02
Run Number	3
Start Time	1642
Stop Time	1737

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	SYSTEM CAL CHECK PRETEST System Response	PRETEST Syst. Bias (% of Span)	POST TEST System Response	POST TEST Syst. Bias (% of Span)	POST TEST Drift (% of Span)	Calibration Correction Factors
CO Zero	0	0		0.6	0.3	0.6	0.0	0.6	0.0	0.0	Co=0.6
CO Low	~30	30.1		30	-0.1						
CO Mid	~60	59.4		59	-0.2						
CO High	80-100 (2)	149.4		149	-0.2	147	-1.0	146	-1.5	-0.5	Cm=146.5
CO2 Zero	0	0		-0.1	-0.4	0	0.4	-0.1	0.0	-0.4	-Co=0.1
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	9.8	-0.8	9.9	-0.4	0.4	Cm=9.9
CO2 High	80-100	20.5		20.5	0.0						
O2 Zero	0	0		-0.1	-0.4	0	0.4	0.1	0.8	0.4	Co=0.1
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		20	0.0	19.8	-0.8	19.9	-0.4	0.4	Cm=19.9
THC Zero	0	0		0.3		4.3	1.3	4.2		0.0	
THC Low	25-35	49.6		49.6	0.0	46.4	-1.1	46.2		-0.1	
THC Mid	45-55	124.6		123	-1.3						
THC High	80-90	298.6		298							
NOx Zero	0	0		-0.1	0.0	10	1.0	10	1.0	0.0	Co=10.0
NOx Low	20-30 (3)										
NOx Mid	45-55	448		448	0.0	463	1.5	464	1.6	0.1	Cm=463.5
NOx High	80-90	885.5		885	-0.1						

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 75% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 1

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/26/2002	10:34:28	146.07	6.221	11 779	46.05		1.44
06/26/2002	10:35:29	146.26	6.185	11.808	45.67		1.44
08/26/2002	10:36:29	142.51	6.171	11.835	45.59		1.43
06/28/2002	10:37:29	142.99	6.176	11.832	45.47		1.44
06/26/2002	10:38:29	141.49	6.15	11.854	45.18		1.43
06/26/2002	10:39:29	142.14	6.168	11.857	44.96		1.43
06/26/2002	10:40:29	141 76	6.144	11.856	45		1.42
06/26/2002	10:41:29	141.27	6.149	11.859	44.73		1.41
06/26/2002	10:42:29	140.86	6.146	11.864	45.12		1.44
06/26/2002	10:43:29	142.42	6.136	11.875	45.18		1.45
06/26/2002	10:44:29	142.94	6.176	11.832	45.05		1.45
06/28/2002	10:45:29	147.63	6.179	11.802	45.16		1.43
06/26/2002	10:46:29	144.77	6.193	11.815	45.53		1.44
06/26/2002	10:47:29	143.12	6.174	11.831	46.45		1.44
06/26/2002	10:48:29	144.34	6.151	11.853	46.01		1.43
06/26/2002	10:49:29	141.19	6.146	11.864	46.49		1.44
08/26/2002	10:50:29	141.7	6.142	11.851	45.97		1.43
06/26/2002	10:51:29	142.79	6.16	11.853	45.29		1.44
06/26/2002	10:52:29	145.53	6.175	11.808	44.8		1.42
06/26/2002	10:53:29	145.45	6.165	11.834	44.64		1.41
06/26/2002	10:54:29	144.3	6.167	11.827	44.56		1.42
06/26/2002	10:55:30	146.38	6.177	11.806	43.55		1.38
06/26/2002	10:56:30	147.56	6.203	11 796	46.21		1.42
06/28/2002	10:57:30	149.59	6.207	11 767	45.47		1.41
06/26/2002	10:58:30	152.79	6.234	11.799	48.61		1.45
06/26/2002	10:59:30	151.66	6.212	11.76	48.05		1.47
06/26/2002	11:00:30	147.96	6.175	11.807	47.49		1.46
06/26/2002	11:01:30	145.33	6.196	11 783	47 11		1.42
06/26/2002	11:02:30	150.81	6.175	11 794	49.39		1.48
06/26/2002	11:03:30	147.96	6.171	11.824	48.31		1.47
08/26/2002	11:04:30	148.34	6.186	11 784	48.12		1.43
06/26/2002	11:05:30	149.77	6.175	11.812	51.27		1.47
08/26/2002	11:06:30	148.79	6.171	11.819	50.23		1.49
08/26/2002	11:07:30	148.09	6.146	11.826	49.38		1.47
06/26/2002	11:08:30	146.99	6.179	11.819	48.84		1.46
06/26/2002	11:09:28	151.09	6.218	11 742	49		1.44
06/26/2002	11:10:28	153.63	6.179	11 799	50.82		1.44
06/26/2002	11:11:28	150.34	6.183	11.804	52.12		1.47
06/26/2002	11:12:28	152.9	6.209	11 747	50.86		1.46
06/26/2002	11:13:28	152.88	6.212	11 773	50.08		1.46
06/26/2002	11:14:28	148.57	6.17	11.808	50.48		1.48
06/26/2002	11:15:28	149.73	6.18	11 789	50.91		1.44
06/26/2002	11:16:28	152.77	6.216	11 761	50.99		1.45
06/26/2002	11:17:28	154.95	6.204	11 763	49.81		1.44
06/26/2002	11:18:29	150.12	6.205	11 779	49.27		1.45
	Average	146.9	6.2	11.8	47.3		1.4

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 75% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 2

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/27/2002	15:22:50	161.23	6.511	12.141	52.89	386.6	1 13
06/27/2002	15:23:50	160.98	6.543	12.089	53.59	390.7	1 12
06/27/2002	15:24:50	160.57	6.584	12.055	53.86	393.4	1 13
06/27/2002	15:25:50	164.15	6.593	12.036	53.28	396.3	1 13
06/27/2002	15:26:50	167 18	6.608	12.02	53.3	397.5	1 14
06/27/2002	15:27:50	166.07	6.625	12.002	53.61	398.8	1 12
06/27/2002	15:28:50	164.2	6.545	12.081	54.48	399.4	1 12
06/27/2002	15:29:50	158.97	6.575	12.06	53.56	394.8	1 13
06/27/2002	15:30:50	159.19	6.559	12.086	53.02	395.4	1 12
06/27/2002	15:31:51	157.06	6.578	12.036	53.53	397.8	1 11
06/27/2002	15:32:51	163.74	6.637	11.977	52.99	402.2	1.12
06/27/2002	15:33:51	164.98	6.61	12.01	53.21	404	1 1
06/27/2002	15:34:51	159.92	6.58	12.066	53.62	402	1.1
06/27/2002	15:35:51	156.15	6.557	12.067	56.55	401.8	1.06
06/27/2002	15:36:51	160.74	6.64	11.963	56.03	404.1	1 12
06/27/2002	15:37:51	164.75	6.622	11.988	55.81	408.4	1 12
06/27/2002	15:38:51	167 19	6.653	11.943	54.09	409.3	1 12
06/27/2002	15:39:51	169.15	6.64	11.988	53.11	408	1.09
06/27/2002	15:40:51	161.52	6.561	12.064	56.84	405.6	1 12
06/27/2002	15:41:51	160.99	6.593	12.043	56.31	402	1 14
06/27/2002	15:42:51	163.53	6.595	12.028	55.44	402.3	1 13
06/27/2002	15:43:51	164.51	6.61	12.007	55.71	404	1 13
06/27/2002	15:44:51	162.39	6.59	12.047	54.95	405.6	1.12
06/27/2002	15:45:51	162.86	6.631	11.972	55.19	407 1	1 1
06/27/2002	15:46:51	165.09	6.632	11.994	55.64	408.6	1.1
06/27/2002	15:47:51	165.21	6.62	11.987	55.65	407.9	1.09
06/27/2002	15:48:51	166.87	6.596	12.036	56	406.1	1.09
06/27/2002	15:49:51	164.12	6.595	12.033	55.45	401 7	1.09
06/27/2002	15:50:51	161.34	6.545	12.101	57.37	399.5	1.08
06/27/2002	15:51:52	159.28	6.573	12.085	58.47	398.3	1 1
06/27/2002	15:52:52	158.19	6.5	12.145	57.84	397.2	1.1
06/27/2002	15:53:50	158 75	6.526	12.132	57.02	392.1	1 11
06/27/2002	15:54:50	158.21	6.524	12.135	57.35	388.7	1 11
06/27/2002	15:55:50	159.52	6.51	12.136	54.91	387.5	1.06
06/27/2002	15:56:50	157 55	6.562	12.083	55.22	391.3	1.05
06/27/2002	15:57:50	160.35	6.569	12.064	57.51	396.2	1.08
06/27/2002	15:58:50	161.8	6.578	12.058	56.81	400.3	1.1
06/27/2002	15:59:50	161.48	6.592	12.044	56.78	401 7	1 11
06/27/2002	16:00:50	159.62	6.552	12.076	55.67	403.2	1.09
06/27/2002	16:01:50	162.24	6.653	11.962	53.93	406.6	1.08
06/27/2002	16:02:50	169.03	6.609	12.002	51 72	410.4	1.07
06/27/2002	16:03:50	163.72	6.622	11.997	51.02	407	1.06
06/27/2002	16:04:50	166.54	6.634	11.982	51.84	407.8	1.07
06/27/2002	16:05:50	163.54	6.647	11.945	51.33	408.3	1.07
06/27/2002	16:06:50	165.59	6.644	11.979	51.43	409.9	1.09
	Average	162.4	6.6	12.0	54.8	401.1	1.1

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 75% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 3

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/27/2002	16:42:28	160.38	6.596	12.024	48.57	397.8	1 14
06/27/2002	16:43:28	166.23	6.68	11.912	49.66	418	1 14
06/27/2002	16:44:28	173.03	6.698	11.884	51.51	422.4	1 15
06/27/2002	16:45:28	170.31	6.666	11.956	53.59	422.8	1 14
06/27/2002	16:46:26	165.59	6.662	11.934	54.06	418.9	1 13
06/27/2002	16:47:26	172.54	6.708	11.875	54.04	418.8	1 14
06/27/2002	16:48:26	174.38	6.695	11.912	53.72	420.7	1 14
06/27/2002	17:06:27	262.76	7 144	11 195	64.61	391.8	1.09
06/27/2002	17:07:27	231.83	7 118	11.286	63.71	420.5	1 1
06/27/2002	17:08:27	224.65	7.016	11.41	61 77	421 7	1.1
06/27/2002	17:09:27	217.25	6.989	11.475	59.28	421.6	1 11
06/27/2002	17:10:27	214.24	7.02	11.414	56.91	419.1	1.11
06/27/2002	17:11:27	217.94	6.955	11.5	54.27	421.9	1.1
06/27/2002	17:12:27	212.52	6.992	11.471	55.45	419.2	1.06
06/27/2002	17:13:27	221.69	6.986	11.445	57	420.4	1.06
06/27/2002	17:14:27	224.45	6.991	11.465	56.4	423.5	1 1
06/27/2002	17:15:27	214.88	6.87	11.625	54.31	421.6	1.1
06/27/2002	17:16:27	198.41	6.875	11.602	54.24	417 1	1.09
06/27/2002	17:17:28	205.21	6.919	11.569	54.26	417.1	1.1
06/27/2002	17:18:28	203.62	6.876	11.594	53.06	417	1.08
06/27/2002	17:19:28	207.27	6.935	11.54	52.84	416.9	1.08
06/27/2002	17:20:28	215.28	6.943	11.518	53.16	418.1	1.07
06/27/2002	17:21:28	206.85	6.9	11.587	52.8	417.9	1.08
06/27/2002	17:22:28	190.39	6.853	11.654	54.08	414.7	1.06
06/27/2002	17:23:28	189.5	6.907	11.56	53.49	413.5	1.08
06/27/2002	17:24:28	196.27	6.913	11.571	52.75	415.9	1.08
06/27/2002	17:25:28	202.02	6.889	11.59	52.42	415.6	1.07
06/27/2002	17:26:28	190.33	6.831	11.675	52.33	414.1	1.05
06/27/2002	17:27:28	199.75	6.92	11.556	53.96	410.4	1.08
06/27/2002	17:28:28	207 19	6.854	11.64	54.35	411.3	1.1
06/27/2002	17:29:26	198.01	6.824	11.698	52.5	407.5	1.08
06/27/2002	17:30:26	190.67	6.823	11.673	52.92	405	1.05
06/27/2002	17:31:26	189.67	6.782	11 761	53.73	406	1.09
06/27/2002	17:32:26	182.7	6.832	11.671	53.39	407.4	1.09
06/27/2002	17:33:26	189.23	6.829	11.66	52.83	410	1.09
06/27/2002	17:34:26	190.67	6.88	11.628	53.7	411.2	1.09
06/27/2002	17:35:26	191.86	6.824	11.675	54.28	414	1.08
06/27/2002	17:36:26	190.53	6.853	11.643	54.83	411 7	1 11
	Average	199.2	6.9	11.6	54.5	415.1	1.1

Data Summary

Run	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
Run 1	10:34-11:18	146.9	6.2	11.8	47.3		1.44
Run 2	16:22-16:06	162.4	6.6	12.0	54.8	401 1	1 10
Run 3	16:42-17:36	199.2	6.9	11.6	54.5	415.1	1.10

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 75% Load
Date:	06/26/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO
Molecular Weight:	28.01

Run No.	Start-Stop Time	Raw Data (ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	10:34-11:18	146.9	149.4	0.5	154.5	142.03
2	15:22-16:06	162.4	149.4	0.6	147.0	165.16
3	16:42-17:36	199.2	149.4	0.6	146.5	203.39
					Average	170.19

Calibration Error Correction
Cgas=(Cobs-Co)*(Cma/(Cm-Co))
Mass Emission Rate (lb/hr)
E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000
Mass Emission Rate (lb/1000 lb fuel)
E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 75% Load
Date:	06/26/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	10:34-11:18	6.2	9.9	-0.4	9.9	6.31
2	15:22-16:06	6.6	9.9	0.1	9.8	6.67
3	16:42-17:36	6.9	9.9	-0.1	9.9	6.92
				Average		6.63

<u>Calibration Error Correction</u>

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 75% Load
Date:	06/26/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	O2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	10:34-11:18	11.8	20.0	-0.3	19.8	12.03
2	15:22-16:06	12.0	20.0	0.0	19.9	12.10
3	16:42-17:36	11.6	20.0	0.1	19.9	11.69
					Average	11.94

Calibration Error Correction
Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Total Hydrocarbon Data Correction

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 75% Load
Date:	06/26/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	THC
Molecular Weight:	16.00

			Source Information		Corrected
Run No.	Start-Stop Time	Raw Data (ppm)	Stack Flow (dscfm)	Stack Moisture (%)	Data Dry Basis (ppm)
1	10:34-11:18	47.3	368	5.41	49.98
2	15:22-16:06	54.8	357	5.69	58.06
3	16:42-17:36	54.5	359	6.22	58.11
				Average	55.38

<u>Moisture Correction</u>

Cgas(dry)=Cgas(wet)/(1-(% moisture/100))

<u>Mass Emission Rate (lb/hr)</u>

E(lb/hr)=Cgas(dry)*MWgas*Qs(dscfm)*60/385300000

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 75% Load
Date:	06/26/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	NOx
Molecular Weight:	46.01

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
2	15:22-16:06	401.1	448.0	7.5	461.0	388.78
3	16:42-17:36	415.1	448.0	10.0	463.5	400.17
					Average	

Note: NOx was not measured during run 1 due to problems with the analyzer.

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000

Mass Emission Rate (lb/1000 lb fuel)

E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

Date:	**Run:**	E-75-1			**Horsepower:**		121.81	
06/26/2002	**Flow (dscfm):**	368.4			**Fuel Usage (gal/hr):**		6.90	
	Moisture (%):	5.41						
	Pollutant:	**NOx**	**CO**	**NMHC**	**THC**	**Methane**	**CO2**	**O2**
	Concentration (ppm or %)	na	142.03	48 54	49.98	1.44	6.31	12.03
	Mass Rate (lb/hr)	na	0.23	0.04	4.56E-02	1.32E-03	0 02	0 02
	Mass Rate (lb/gal fuel)	na	0 03	0.01	0.01	0.00	0.00	0.00
	Mass Rate (gr/hp*hr)	na	0.85	0.16	0.17	0.00	0.06	0.08

Date:	**Run:**	E-75-2			**Horsepower:**		128.09	
06/27/2002	**Flow (dscfm):**	357.2			**Fuel Usage (gal/hr):**		7.26	
	Moisture (%):	5.69						
	Pollutant:	**NOx**	**CO**	**NMHC**	**THC**	**Methane**	**CO2**	**O2**
	Concentration (ppm or %)	388.78	165 16	56 96	58.06	1.10	6.67	12.10
	Mass Rate (lb/hr)	0.99	0.26	0.05	5.13E-02	9.79E-04	0.02	0.02
	Mass Rate (lb/gal fuel)	0.14	0.04	0.01	0.01	0 00	0 00	0.00
	Mass Rate (gr/hp*hr)	3.53	0.91	0.18	0.18	0.00	0.06	0.08

Date:	**Run:**	E-75-3			**Horsepower:**		124.47	
06/27/2002	**Flow (dscfm):**	359.3			**Fuel Usage (gal/hr):**		7.05	
	Moisture (%):	6.22						
	Pollutant:	**NOx**	**CO**	**NMHC**	**THC**	**Methane**	**CO2**	**O2**
	Concentration (ppm or %)	400.17	203.39	57.01	58.11	1.10	6.92	11 69
	Mass Rate (lb/hr)	1.03	0.32	0.05	5.17E-02	9.85E-04	0 02	0 02
	Mass Rate (lb/gal fuel)	0.15	0.05	0.01	0.01	0.00	0 00	0.00
	Mass Rate (gr/hp*hr)	3.76	1.16	0.18	0.19	0.00	0.06	0.08

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	100% Load - Generator 1
Date	06/27/2002
Run Number	1
Start Time	1020
Stop Time	1105

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
						PRETEST		POST TEST			
	Specification (% of Span)	Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	Drift (% of Span)	
CO Zero	0	0		0.6	0.3	0.6	0.0	0.6	0.0	0.0	Co=0.6
CO Low	~30	30.1		30	-0.1						
CO Mid	~60	59.4		59.6	0.1						
CO High	80-100 (2)	149.4		149	-0.2	149	0.0	149	0.0	0.0	Cm=149.0
CO2 Zero	0	0		-0.1	-0.4	-0.1	0.0	-0.1	0.0	0.0	-Co=0.1
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	10	0.0	9.9	-0.4	-0.4	Cm=10.0
CO2 High	80-100	20.5		20.5	0.0						
O2 Zero	0	0		-0.1	-0.4	-0.1	0.0	-0.1	0.0	0.0	-Co=0.1
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		20	0.0	20	0.0	20.1	0.4	0.4	Cm=20.1
THC Zero	0	0		0.3		0.3	0.0	4.4		1.4	
THC Low	25-35	49.6		49.6	0.0	49.6	0.0	47.8		-0.6	
THC Mid	45-55	124.6		123	-1.3	123	0.0				
THC High	80-90	298.6		298		298	0.0				
NOx Zero	0	0									
NOx Low	20-30 (3)										
NOx Mid	45-55	448									
NOx High	80-90	885.5									

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	100% Load - Generator 1
Date	06/27/02
Run Number	2
Start Time	1220
Stop Time	1305

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	SYSTEM CAL CHECK PRETEST System Response	PRETEST Syst. Bias (% of Span)	POST TEST System Response	POST TEST Syst. Bias (% of Span)	Drift (% of Span)	Calibration Correction Factors
CO Zero	0	0		0.6	0.3	0.6	0.0	0.6	0.0	0.0	Co=0.6
CO Low	~30	30.1		30	-0.1						
CO Mid	~60	59.4		59.6	0.1						
CO High	80-100 (2)	149.4		149	-0.2	149	0.0	148	-0.5	-0.5	Cm=148.5
CO2 Zero	0	0		-0.1	-0.4	-0.1	0.0	0.1	0.8	0.8	Co=0.0
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	9.9	-0.4	10	0.0	0.4	Cm=10.0
CO2 High	80-100	20.5		20.5	0.0						
O2 Zero	0	0		-0.1	-0.4	-0.1	0.0	-0.1	0.0	0.0	-Co=0.1
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		20	0.0	20.1	0.4	19.8	-0.8	-1.2	Cm=20.0
THC Zero	0	0		0.3		4.4	1.4	3.6		-0.3	
THC Low	25-35	49.6		49.6	0.0	47.8	-0.6	47		-0.3	
THC Mid	45-55	124.6		123	-1.3						
THC High	80-90	298.6		298							
NOx Zero	0	0		-0.1	0.0	0	0.0	3	0.3	0.3	Co=1.5
NOx Low	20-30 (3)										
NOx Mid	45-55	448		448	0.0	448	0.0	453	0.5	0.5	Cm=450.5
NOx High	80-90	885.5		885	-0.1						

CEM CALIBRATION DATA

Plant Name	Elmendorf AFB
Sampling Location	100% Load - Generator 1
Date	06/27/02
Run Number	3
Start Time	1325
Stop Time	1447

Plant Rep.	Mark Wade
Team Leader	Tom Gerstle
CEM Operator	Doug Allen
Project Number	030174.0003.002

	Analyzer Number	Analyzer Span
CO		200
CO2		25
O2		25
THC		300
NOx		1000

	Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	SYSTEM CAL CHECK PRETEST System Response	Syst. Bias (% of Span)	POST TEST System Response	Syst. Bias (% of Span)	Drift (% of Span)	Calibration Correction Factors
CO Zero	0	0		0.6	0.3	0.6	0.0	0.6	0.0	0.0	Co=0.6
CO Low	~30	30.1		30	-0.1						
CO Mid	~60	59.4		59.6	0.1						
CO High	80-100 (2)	149.4		149	-0.2	148	-0.5	147	-1.0	-0.5	Cm=147.5
CO2 Zero	0	0		-0.1	-0.4	0.1	0.8	0.1	0.8	0.0	Co=0.1
CO2 Low	NR										
CO2 Mid	40-60	9.9		10	0.4	10	0.0	9.7	-1.2	-1.2	Cm=9.9
CO2 High	80-100	20.5		20.5	0.0						
O2 Zero	0	0		-0.1	-0.4	-0.1	0.0	0	0.4	0.4	-Co=0.1
O2 Low	NR										
O2 Mid	40-60	10.5		10.5	0.0						
O2 High	80-100	20		20	0.0	19.8	-0.8	20	0.0	0.8	Cm=19.9
THC Zero	0	0		0.3		3.6	1.1	3.8		0.1	
THC Low	25-35	49.6		49.6	0.0	47	-0.9	47.1		0.0	
THC Mid	45-55	124.6		123	-1.3						
THC High	80-90	298.6		298							
NOx Zero	0	0		-0.1	0.0	3	0.3	5	0.5	0.2	Co=4.0
NOx Low	20-30 (3)										
NOx Mid	45-55	448		448	0.0	453	0.5	459	1.1	0.6	Cm=456.0
NOx High	80-90	885.5		885	-0.1						

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 100% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 1

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/27/2002	10:20:48	168.7	6.744	11.691	40.71		1.36
06/27/2002	10:21:48	165.63	6.721	11 719	40.26		1.35
06/27/2002	10:22:48	165.72	6.759	11.687	42.16		1.42
06/27/2002	10:23:48	167.23	6.683	11 753	45.56		1.64
06/27/2002	10:24:49	184.66	6.844	11.524	42.19		1.67
06/27/2002	10:25:49	199.83	6.951	11.368	40.68		1.62
06/27/2002	10:26:49	199.82	6.961	11.354	40.75		1.61
06/27/2002	10:27:49	199.83	6.964	11.368	40.83		1.58
06/27/2002	10:28:49	199.83	6.921	11.411	41.09		1.6
06/27/2002	10:29:49	199.83	6.926	11.432	40.78		1.59
06/27/2002	10:30:47	199.83	6.904	11.442	40.77		1.58
06/27/2002	10:31:47	199.83	6.883	11.468	40.88		1.57
06/27/2002	10:32:47	199.83	6.912	11.456	40.08		1.55
06/27/2002	10:33:47	199.83	6.875	11.477	38.59		1.49
06/27/2002	10:34:47	199.83	6.883	11.489	40.84		1.52
06/27/2002	10:35:47	199.83	6.876	11.489	40.6		1.6
06/27/2002	10:36:47	199.83	6.905	11.445	39.69		1.57
06/27/2002	10:37:47	199.83	6.94	11.406	37.91		1.48
06/27/2002	10:38:47	199.83	6.949	11.369	38.38		1.45
06/27/2002	10:39:47	199.83	6.929	11.432	39.46		1.49
06/27/2002	10:40:47	199.83	6.849	11.505	39.42		1.53
06/27/2002	10:41:47	199.83	6.855	11.506	40.08		1.53
06/27/2002	10:42:47	199.83	6.913	11.43	39.65		1.56
06/27/2002	10:43:47	199.83	6.899	11.444	39.95		1.53
06/27/2002	10:44:47	199.83	6.942	11.41	40.26		1.61
06/27/2002	10:45:47	199.83	6.939	11.387	39.69		1.56
06/27/2002	10:46:47	199.83	6.953	11.383	39.48		1.49
06/27/2002	10:47:48	199.83	6.923	11.419	39.7		1.52
06/27/2002	10:48:48	199.83	6.894	11.458	40.54		1.5
06/27/2002	10:49:48	199.83	6.872	11.504	40.03		1.51
06/27/2002	10:50:48	199.83	6.866	11.482	39.87		1.5
06/27/2002	10:51:48	199.83	6.948	11.398	39.36		1.45
06/27/2002	10:52:48	199.83	6.921	11.425	45.37		1.43
06/27/2002	10:53:48	199.83	6.909	11.443	43.99		1.47
06/27/2002	10:54:48	199.83	6.926	11.42	41.89		1.53
06/27/2002	10:55:48	199.83	6.912	11.424	40.5		1.46
06/27/2002	10:56:48	199.83	6.916	11.446	38.1		1.4
06/27/2002	10:57:48	199.83	6.905	11.437	37.4		1.4
06/27/2002	10:58:48	199.83	6.969	11.356	37 7		1.42
06/27/2002	10:59:48	199.83	6.956	11.371	38.7		1.44
06/27/2002	11:00:48	199.83	6.949	11.371	40.48		1.45
06/27/2002	11:01:48	199.83	6.95	11.393	40.9		1.48
06/27/2002	11:02:48	199.83	6.901	11.43	39.22		1.41
06/27/2002	11:03:48	199.83	7.006	11.295	37.65		1.41
06/27/2002	11:04:48	199.83	7.002	11.296	37 71		1.42
	Average	196.6	6.9	11.4	40.2		1.5

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 100% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 2		CO	CO2	O2	THC	NOx	Methane
Date	Time	ppm	%	%	ppm	ppm	ppm
06/27/2002	12:20:39	364.26	6.974	11.055	41.9	519	1.58
06/27/2002	12:21:39	374.95	7.095	11 118	42.55	524.7	1.58
06/27/2002	12:22:39	383.32	7.057	11.089	41.85	528.3	1.58
06/27/2002	12:23:39	347.79	7.06	11 156	42.38	529.4	1.57
06/27/2002	12:24:37	370.3	7.081	11.091	41.8	529.9	1.58
06/27/2002	12:25:37	361.5	7.072	11 164	42.05	531 7	1.57
06/27/2002	12:26:37	359.61	7.069	11 134	42.05	531.3	1.57
06/27/2002	12:27:37	362.8	7.068	11 149	42.96	530.9	1.59
06/27/2002	12:28:37	369.45	7.069	11 133	43.06	528.5	1.59
06/27/2002	12:29:37	379.63	7.065	11 146	43.02	528.5	1.59
06/27/2002	12:30:38	364.29	7.09	11.155	43.45	529.7	1.6
06/27/2002	12:31:38	373.83	7.061	11.16	41.02	528.9	1.55
06/27/2002	12:32:38	364.11	7.067	11 189	42.98	528.2	1.56
06/27/2002	12:33:38	349.64	7.062	11 155	41.85	528.4	1.54
06/27/2002	12:34:38	347.2	7.058	11.211	41.4	527.2	1.53
06/27/2002	12:35:38	342.88	7.051	11 168	43.65	526.2	1.56
06/27/2002	12:36:38	346.64	7.032	11 184	42.94	525.7	1.55
06/27/2002	12:37:38	347.69	7.054	11 189	42.6	526.7	1.56
06/27/2002	12:38:38	343.66	7.037	11 178	42.09	528.7	1.53
06/27/2002	12:39:38	347	7.039	11.215	42.64	528.9	1.54
06/27/2002	12:40:38	332.44	7.037	11.233	42.28	529.3	1.56
06/27/2002	12:41:38	338.9	7.002	11.217	43.94	526.2	1.6
06/27/2002	12:42:38	337 18	7.009	11.22	44.33	525.7	1.62
06/27/2002	12:43:38	341.29	6.975	11 185	44.01	526.6	1.58
06/27/2002	12:47:38	342.51	7 101	11 106	40.6	328.5	1.54
06/27/2002	12:48:38	381 72	7 111	11.087	40.28	529.9	1.5
06/27/2002	12:49:39	359.23	7.1	11 134	40.6	538.5	1.49
06/27/2002	12:50:39	371 75	7 136	11.064	40.22	538.7	1.48
06/27/2002	12:51:39	393.37	7 147	11.054	40.32	539.9	1.47
06/27/2002	12:52:39	387.49	7.153	11.067	39.41	541	1.46
06/27/2002	12:53:39	384.58	7.11	11.098	38.78	540.6	1.44
06/27/2002	12:54:39	366.46	7.117	11 125	38.08	541.4	1.43
06/27/2002	12:55:39	362.72	7.11	11 112	37.23	541.5	1.37
06/27/2002	12:56:39	384.48	7 137	11.074	37.56	540.3	1.39
06/27/2002	12:57:39	366.83	7 107	11.127	36.17	542.2	1.38
06/27/2002	12:58:39	372.64	7 182	10.99	34.56	543.2	1.35
06/27/2002	12:59:39	385.91	7.244	10.93	34.09	552.2	1.35
06/27/2002	13:00:39	391.07	7.247	10.909	33.54	556.1	1.33
06/27/2002	13:01:39	387.56	7.202	10.995	34.19	557 7	1.35
06/27/2002	13:02:39	380.24	7 185	11.02	33.77	556.3	1.36
06/27/2002	13:03:39	379.19	7 181	11.018	34.36	554.1	1.37
06/27/2002	13:04:39	376.75	7.201	11.003	35.22	554.7	1.4
	Average	364.4	7.1	11.1	40.3	530.1	1.5

CEM Data

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 100% Load
Project Number:	030174.0003.002
CEM Operator:	Doug Allen

Run 3

Date	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
06/27/2002	13:25:58	376.48	7 156	11 115	44.23	526.2	1.59
06/27/2002	13:26:58	366.4	7 124	11 126	44.15	526.8	1.59
06/27/2002	13:27:56	375.36	7 122	11 101	44.72	523.5	1.6
06/27/2002	13:28:56	384.77	7 119	11.079	44.35	525.5	1.6
06/27/2002	13:29:56	372.54	7 119	11 132	43.82	526.3	1.56
06/27/2002	13:30:56	380.98	7 126	11.064	43.28	526.5	1.56
06/27/2002	13:31:56	400.33	7 118	11.042	43.54	527.2	1.56
06/27/2002	13:32:56	397.26	7 137	11.093	45.12	526.9	1.57
06/27/2002	13:33:56	378.92	7 143	11.095	45.39	525.9	1.58
06/27/2002	13:34:56	366.11	7 126	11 103	45.02	523.1	1.58
06/27/2002	13:35:56	372.67	7 124	11.048	45.33	523.3	1.59
06/27/2002	13:36:56	377.87	7.097	11.046	45.15	525.9	1.56
06/27/2002	13:37:56	369.58	7.12	11.098	45.34	526.2	1.58
06/27/2002	13:38:56	365.79	7 105	11 148	45.67	524.9	1.58
06/27/2002	13:39:56	346.74	7.086	11 153	46.02	525.3	1.6
06/27/2002	13:40:57	376.54	7.08	11.078	44.69	522.7	1.58
06/27/2002	13:41:57	366.31	7.096	11 126	44.82	525.3	1.55
06/27/2002	13:42:57	354.95	7 116	11.157	44.19	524.9	1.55
06/27/2002	13:43:57	354.31	7.073	11.1	44.31	523.3	1.53
06/27/2002	13:44:57	379.39	7.102	11.085	43.84	524.1	1.52
06/27/2002	13:45:57	367.63	7.15	11 115	44.88	525.2	1.54
06/27/2002	13:46:57	372.04	7 115	11.065	44.3	524.1	1.55
06/27/2002	13:47:57	395.96	7 197	10.972	42.63	525	1.51
06/27/2002	13:48:57	389.62	7.207	10.969	42.89	533.8	1.52
06/27/2002	13:49:57	386.6	7.229	10.98	42.8	537.6	1.53
06/27/2002	13:50:57	399.23	7.28	10.867	41.67	538.2	1.54
06/27/2002	13:51:57	397.39	7.281	10.906	41 12	543.5	1.52
06/27/2002	13:52:57	381 78	7.262	10.911	40.65	547.3	1.5
06/27/2002	13:53:57	388.96	7.267	10.899	39.86	547.2	1.47
06/27/2002	13:54:57	401.31	7.316	11.662	48.01	547.5	1.51
06/27/2002	14:33:57	184.08	3.689	11.877	48.6	370.9	1 12
06/27/2002	14:34:57	161.45	5.203	12.051	49.68	381 1	1.09
06/27/2002	14:35:57	183.16	5.92	11.307	47 76	382.6	1.1
06/27/2002	14:36:57	214.42	6.376	11.337	47.14	440.5	1.08
06/27/2002	14:37:57	205.61	6.628	11.46	47.4	454.9	1.08
06/27/2002	14:38:57	202.86	6.783	11.469	47.92	450.8	1.1
06/27/2002	14:39:57	197 15	6.722	11.642	50.56	446.9	1.08
06/27/2002	14:40:57	193.82	6.619	11.694	52.3	440	1.09
06/27/2002	14:41:57	185.56	6.768	11.588	51.23	436.5	1.09
06/27/2002	14:42:58	200.04	6.758	11.627	50.61	445.3	1.08
06/27/2002	14:43:58	189.65	6.602	11.657	49.01	444.8	1.07
06/27/2002	14:44:58	192.29	6.431	11.664	50.35	436.4	1.06
06/27/2002	14:45:58	195.09	6.321	11.526	54.14	438.9	1.03
06/27/2002	14:46:58	199.51	6.532	11.501	50.13	456.3	1.07
	Average	319.3	6.9	11.2	45.9	497.7	1.4

Data Summary

Run	Time	CO ppm	CO2 %	O2 %	THC ppm	NOx ppm	Methane ppm
Run 1	10:20-11:04	325.0	6.9	11.4	40.2		1.51
Run 2	12:20-13:04	364.4	7 1	11 1	40.3	530.1	1.50
Run 3	13:25-14:46	319.3	6.9	11.2	45.9	497.7	1.40

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 100% Load
Date:	06/27/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO
Molecular Weight:	28.01

Run No.	Start-Stop Time	Raw Data (ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
1	10:20-11:04	325.0	149.4	0.6	149.0	326.59
2	12:20-13:04	364.4	149.4	0.6	148.5	367.49
3	13:25-14:46	319.3	149.4	0.6	147.5	324.11
					Average	339.39

Calibration Error Correction

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Mass Emission Rate (lb/hr)

E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000

Mass Emission Rate (lb/1000 lb fuel)

E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 100% Load
Date:	06/27/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	CO2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
			Cma	Co	Cm	
1	10:20-11:04	6.9	9.9	-0.1	10.0	6.90
2	12:20-13:04	7.1	9.9	0.0	10.0	7.06
3	13:25-14:46	6.9	9.9	0.1	9.9	6.87
					Average	6.94

<u>Calibration Error Correction</u>

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 100% Load
Date:	06/27/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	O2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
			Cma	Co	Cm	
1	10:20-11:04	11.4	20.0	-0.1	20.1	11.46
2	12:20-13:04	11.1	20.0	-0.1	20.0	11.19
3	13:25-14:46	11.2	20.0	-0.1	19.9	11.32
					Average	11.32

<u>Calibration Error Correction</u>

Cgas=(Cobs-Co)*(Cma/(Cm-Co))

Total Hydrocarbon Data Correction

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 100% Load
Date:	06/27/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	THC
Molecular Weight:	16.00

			Source Information		Corrected
Run No.	Start-Stop Time	Raw Data (ppm)	Stack Flow (dscfm)	Stack Moisture (%)	Data Dry Basis (ppm)
1	10:20-11:04	40.2	365	7.87	43.66
2	12:20-13:04	40.3	343	6.00	42.85
3	13:25-14:46	45.9	325	6.54	49.09
				Average	45.20

<u>Moisture Correction</u>
Cgas(dry)=Cgas(wet)/(1-(% moisture/100))
<u>Mass Emission Rate (lb/hr)</u>
E(lb/hr)=Cgas(dry)*MWgas*Qs(dscfm)*60/385300000

CEM Data Correction Data Sheet

Plant Name:	Elmendorf AFB
Sampling Location:	Gen. 1 - 100% Load
Date:	06/27/2002
Project Number:	030174.0003.002
CEM Operator:	Doug Allen
Pollutant:	N0x
Molecular Weight:	46.01

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data Cma	Co	Cm	Calibration Corrected Data (% or ppm)
2	12:20-13:04	530.1	448.0	1.5	450.5	527.45
3	13:25-14:46	497.7	448.0	4.0	456.0	489.34
					Average	

Note: NOx was not measured during run 1 due to problems with the analyzer

Calibration Error Correction
Cgas=(Cobs-Co)*(Cma/(Cm-Co))
Mass Emission Rate (lb/hr)
E(lb/hr)=Cgas*MWgas*Qs(dscfm)*60/385300000
Mass Emission Rate (lb/1000 lb fuel)
E(lb/MMBtu)=E(lb/hr)/Fuel flow * 1000

Pollutant	MWgas
CO	28.01
Methane	16.00
NOx	46.01
SO2	64.06

Date:	Run:	E-100-1			Horsepower:		127.31	
06/27/2002	Flow (dscfm):	364.8			Fuel Usage (gal/hr):		6.92	
	Moisture (%):	7.87						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	na	326.59	42.15	43.66	1.51	6.90	11.46
	Mass Rate (lb/hr)	na	0 52	0.04	3.94E-02	1.37E-03	0.02	0.02
	Mass Rate (lb/gal fuel)	na	0.08	0.01	0 01	0.00	0.00	0.00
	Mass Rate (gr/hp*hr)	na	1.85	0.14	0.14	0.00	0.06	0.07

Date:	Run:	E-100-2			Horsepower:		128.13	
06/27/2002	Flow (dscfm):	343.4			Fuel Usage (gal/hr):		6.97	
	Moisture (%):	6						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	527.45	367.49	41.35	42 85	1.50	7.06	11 19
	Mass Rate (lb/hr)	1 30	0.55	0.04	3.64E-02	1.28E-03	0.02	0.02
	Mass Rate (lb/gal fuel)	0 19	0 08	0.01	0.01	0.00	0.00	0.00
	Mass Rate (gr/hp*hr)	4.60	1.95	0.12	0.13	0.00	0.06	0.07

Date:	Run:	E-100-3			Horsepower:		126.95	
06/27/2002	Flow (dscfm):	325.2			Fuel Usage (gal/hr):		6.91	
	Moisture (%):	6.54						
	Pollutant:	NOx	CO	NMHC	THC	Methane	CO2	O2
	Concentration (ppm or %)	489.34	324.11	47 69	49.09	1.40	6.87	11.32
	Mass Rate (lb/hr)	1.14	0.46	0.04	3.95E-02	1.13E-03	0 02	0.02
	Mass Rate (lb/gal fuel)	0.17	0.07	0.01	0.01	0.00	0.00	0.00
	Mass Rate (gr/hp*hr)	4.08	1.64	0.14	0.14	0.00	0.05	0.07

PARTICULATE
TRAVIS AFB

Summary of Stack Gas Parameters and Test Results
030174.0003.002
Travis AFB
US EPA Test Method 5 - Particulate Matter
Generator Outlet

	RUN NUMBER	***M5-10-1***	***M5-10-2***	***M5-10-3***	
	RUN DATE	***06/13/2002***	***06/13/2002***	***06/13/2002***	***Average***
	RUN TIME	***0730-0830***	***0845-0945***	***1000-1100***	
	MEASURED DATA				
P_{static}	Stack Static Pressure, inches H_2O	-1.20	-1 20	-1.20	-1.20
y	Meter Box Correction Factor	1.001	1.001	1.001	1.001
P_{bar}	Barometric Pressure, inches Hg	30 40	30.40	30.40	30.40
V_m	Sample Volume, ft^3	50.668	52.055	52.345	51.689
$Dp^{1/2}$	Average Square Root Dp, (in. H_2O)$^{1/2}$	1.3153	1.3153	1.3153	1.3153
DH	Avg Meter Orifice Pressure, in. H_2O	2.47	2.50	2.50	2.49
T_m	Average Meter Temperature, °F	87	100	97	95
T_s	Average Stack Temperature, °F	471	477	490	479
V_{lc}	Condensate Collected, ml	43.1	38.4	42.0	41.2
CO_2	Carbon Dioxide content, % by volume	3.0	3.0	3.0	3.0
O_2	Oxygen content, % by volume	17.0	17.0	17.0	17.0
N_2	Nitrogen content, % by volume	80.0	80.0	80.0	80.0
C_p	Pitot Tube Coefficient	0.99	0.99	0.99	0.99
	Circular Stack? 1=Y,0=N:	1	1	1	
As	Diameter or Dimensions, inches:	4.00	4.00	4.00	4.00
Q	Sample Run Duration, minutes	60	60	60	60
D_n	Nozzle Diameter, inches	0.205	0.205	0.205	0.205
	CALCULATED DATA				
A_n	Nozzle Area, ft^2	0.000229	0.000229	0.000229	0.000229
$V_{m(std)}$	Standard Meter Volume, ft^3	49.978	50.214	50.751	50.314
$V_{m(std)}$	Standard Meter Volume, m^3	1.415	1.422	1 437	1 425
Q_m	Average Sampling Rate, dscfm	0.833	0.837	0.846	0.839
P_s	Stack Pressure, inches Hg	30.31	30.31	30.31	30 31
B_{ws}	Moisture, % by volume	3.9	3.5	3.7	3.7
$B_{ws(sat)}$	Moisture (at saturation), % by volume	3643.0	3860 9	4366.7	3956.9
V_{wstd}	Standard Water Vapor Volume, ft^3	2.029	1 807	1.977	1.938
$1-B_{ws}$	Dry Mole Fraction	0.961	0.965	0.963	0.963
M_d	Molecular Weight (d.b.), lb/lb•mole	29.16	29 16	29.16	29.16
M_s	Molecular Weight (w.b.), lb/lb•mole	28 72	28 77	28.74	28.75
V_s	Stack Gas Velocity, ft/s	115.1	115.4	116.2	115.6
A	Stack Area, ft^2	0.087	0.087	0.087	0.087
Q_a	Stack Gas Volumetric flow, acfm	603	604	609	605
Q_s	Stack Gas Volumetric flow, dscfm	333	333	330	332
Q_s	Stack Gas Volumetric flow, dscmm	9	9	9	9
I	Isokinetic Sampling Ratio, %	95.4	95.8	97.7	96.3

Summary of Stack Gas Parameters and Test Results
030174.0003.002
Travis AFB
US EPA Test Method 5 - Particulate Matter
Generator Outlet
Page 2 of 2

	RUN NUMBER RUN DATE RUN TIME	M5-10-1 06/13/2002 0730-0830	M5-10-2 06/13/2002 0845-0945	M5-10-3 06/13/2002 1000-1100	Average
	EMISSIONS DATA				
	Particulate Matter				
PM	Filter Weight Gain, mg	21.55	72.7	28.3	
PM	Beaker Weight Gain, mg	5.15	4.85	7.25	
PM	Total Catch, g	0.0267	0 0776	0.0356	0.0466
C_{PM}	**Concentration, gr/dscf**	**8.24E-03**	**2.38E-02**	**1.08E-02**	**1.43E-02**
C_{PM}	**Concentration, lb/dscf**	**1.18E-06**	**3.40E-06**	**1.54E-06**	**2.04E-06**
E_{PM}	**Emission Rate, lb/hr**	**2.35E-02**	**6.80E-02**	**3.06E-02**	**4.07E-02**
	Condensible Matter				
PM	Organic Gain, mg				
PM	Aqueous Gain, mg	18.7	19.9	17.6	
PM	Total Catch, g	0.0187	0.0199	0 0176	0.02
C_{PM}	**Concentration, gr/dscf**	**5.77E-03**	**6.12E-03**	**5.35E-03**	**5.75E-03**
C_{PM}	**Concentration, lb/dscf**	**8.25E-07**	**8.74E-07**	**7.65E-07**	**8.21E-07**
E_{PM}	**Emission Rate, lb/hr**	**1.65E-02**	**1.74E-02**	**1.51E-02**	**1.63E-02**
	Total Particulate Matter				
PM	Total Catch, g	4.54E-02	9.75E-02	5.32E-02	0.07
C_{PM}	**Concentration, gr/dscf**	**1.40E-02**	**2.99E-02**	**1.62E-02**	**2.00E-02**
C_{PM}	**Concentration, lb/dscf**	**2.00E-06**	**4.28E-06**	**2.31E-06**	**2.86E-06**
E_{PM}	**Emission Rate, lb/hr**	**4.00E-02**	**8.54E-02**	**4.57E-02**	**5.70E-02**

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	RUN NUMBER ***RUN DATE*** ***RUN TIME***	***M5-25-1*** ***06/11/2002*** ***1255-1355***	***M5-25-2*** ***06/11/2002*** ***1410-1510***	***M5-25-3*** ***06/11/2002*** ***1530-1630***	***Average***
	MEASURED DATA				
P_{static}	Stack Static Pressure, inches H_2O	-2.00	-2.00	-2.00	-2.00
y	Meter Box Correction Factor	1.001	1.001	1.001	1.001
P_{bar}	Barometric Pressure, inches Hg	30.30	30.30	30.30	30.30
V_m	Sample Volume, ft^3	54.087	53.622	55.230	54.313
$Dp^{1/2}$	Average Square Root Dp, (in. $H_2O)^{1/2}$	1.4142	1.4142	1.4142	1.4142
DH	Avg Meter Orifice Pressure, in H_2O	2.70	2.68	2.70	2.69
T_m	Average Meter Temperature, °F	99	102	105	102
T_s	Average Stack Temperature, °F	553	557	557	556
V_{lc}	Condensate Collected, ml	50.5	43.9	47.4	47.3
CO_2	Carbon Dioxide content, % by volume	3.6	3.7	3.9	3.7
O_2	Oxygen content, % by volume	15.9	15.9	15.5	15.8
N_2	Nitrogen content, % by volume	80.5	80.4	80.6	80.5
C_p	Pitot Tube Coefficient	0.99	0.99	0.99	0.99
	Circular Stack? 1=Y,0=N:	1	1	1	
As	Diameter or Dimensions, inches:	4.00	4.00	4.00	4.00
Q	Sample Run Duration, minutes	60	60	60	60
D_n	Nozzle Diameter, inches	0.205	0.205	0.205	0.205
	CALCULATED DATA				
A_n	Nozzle Area, ft^2	0.000229	0.000229	0.000229	0.000229
$V_{m(std)}$	Standard Meter Volume, ft^3	52.107	51.380	52.643	52.043
$V_{m(std)}$	Standard Meter Volume, m^3	1.475	1.455	1.491	1.474
Q_m	Average Sampling Rate, dscfm	0.868	0.856	0.877	0.867
P_s	Stack Pressure, inches Hg	30.15	30.15	30.15	30.15
B_{ws}	Moisture, % by volume	4.4	3.9	4.1	4.1
$B_{ws(sat)}$	Moisture (at saturation), % by volume	7597.4	7847.4	7847.4	7764.1
V_{wstd}	Standard Water Vapor Volume, ft^3	2.377	2.066	2.231	2.225
$1\text{-}B_{ws}$	Dry Mole Fraction	0.956	0.961	0.959	0.959
M_d	Molecular Weight (d.b.), lb/lb•mole	29.21	29.23	29.24	29.23
M_s	Molecular Weight (w.b.), lb/lb•mole	28.72	28.79	28.79	28.77
V_s	Stack Gas Velocity, ft/s	129.4	129.5	129.6	129.5
A	Stack Area, ft^2	0.1	0.1	0.1	0.09
Q_a	Stack Gas Volumetric flow, acfm	678	678	678	678
Q_s	Stack Gas Volumetric flow, dscfm	340	341	340	341
Q_s	Stack Gas Volumetric flow, dscmm	10	10	10	10
I	Isokinetic Sampling Ratio, %	97.2	95.6	98.2	97.0

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	RUN DATE	***06/11/2002***	***06/11/2002***	***06/11/2002***	***Average***
	RUN TIME	***1255-1355***	***1410-1510***	***1530-1630***	
	EMISSIONS DATA				
	Particulate Matter				
PM	Filter Weight Gain, mg	25.15	117.15	29.85	
PM	Beaker Weight Gain, mg	5.4	5.9	8.15	
PM	Total Catch, g	0.0306	0.1231	0.0380	0.0639
C_{PM}	**Concentration, gr/dscf**	**9.05E-03**	**3.70E-02**	**1.11E-02**	**1.90E-02**
C_{PM}	**Concentration, lb/dscf**	**1.29E-06**	**5.28E-06**	**1.59E-06**	**2.72E-06**
E_{PM}	**Emission Rate, lb/hr**	**0.03**	**0.11**	**0.03**	**0.06**
	Condensible Matter				
PM	Organic Gain, mg				
PM	Aqueous Gain, mg	21.9	16.7	19	
PM	Total Catch, g	0.0219	0.0167	0.0190	0.02
C_{PM}	**Concentration, gr/dscf**	**6.49E-03**	**5.02E-03**	**5.57E-03**	**5.69E-03**
C_{PM}	**Concentration, lb/dscf**	**9.27E-07**	**7.17E-07**	**7.96E-07**	**8.13E-07**
E_{PM}	**Emission Rate, lb/hr**	**1.89E-02**	**1.47E-02**	**1.62E-02**	**1.66E-02**
	Total Particulate Matter				
PM	Total Catch, g	5.25E-02	1.40E-01	5.70E-02	0.08
C_{PM}	**Concentration, gr/dscf**	**1.55E-02**	**4.20E-02**	**1.67E-02**	**2.47E-02**
C_{PM}	**Concentration, lb/dscf**	**2.22E-06**	**6.00E-06**	**2.39E-06**	**3.53E-06**
E_{PM}	**Emission Rate, lb/hr**	**4.53E-02**	**1.23E-01**	**4.87E-02**	**7.23E-02**

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	RUN DATE	***06/12/2002***	***06/12/2002***	***06/12/2002***	***Average***
	RUN TIME	***Time***	***Time***	***Time***	
	MEASURED DATA				
P_{static}	Stack Static Pressure, inches H_2O	-2 20	-2.20	-2.20	-2.20
y	Meter Box Correction Factor	1.001	1 001	1.001	1.001
P_{bar}	Barometric Pressure, inches Hg	30.30	30 30	30.30	30.30
V_m	Sample Volume, ft^3	38.179	39.127	39.661	38 989
$Dp^{1/2}$	Average Square Root Dp, (in. $H_2O)^{1/2}$	1.4491	1.4491	1.4491	1.4491
DH	Avg Meter Orifice Pressure, in. H_2O	1 40	1.40	1.40	1.40
T_m	Average Meter Temperature, °F	66	79	83	76
T_s	Average Stack Temperature, °F	617	632	633	627
V_{lc}	Condensate Collected, ml	40.6	42.2	40.9	41.2
CO_2	Carbon Dioxide content, % by volume	4.0	5.0	5.0	4 7
O_2	Oxygen content, % by volume	15.0	14.0	14.0	14 3
N_2	Nitrogen content, % by volume	81.0	81.0	81 0	81.0
C_p	Pitot Tube Coefficient	0.99	0.99	0.99	0 99
	Circular Stack? 1=Y,0=N:	1	1	1	
As	Diameter or Dimensions, inches:	4.00	4.00	4.00	4.00
Q	Sample Run Duration, minutes	60	60	60	60
D_n	Nozzle Diameter, inches	0.178	0.178	0.178	0 178
	CALCULATED DATA				
A_n	Nozzle Area, ft^2	0.000173	0.000173	0.000173	0.000173
$V_{m(std)}$	Standard Meter Volume, ft^3	38.966	38.971	39.211	39.049
$V_{m(std)}$	Standard Meter Volume, m^3	1 103	1 104	1.110	1.106
Q_m	Average Sampling Rate, dscfm	0.649	0.650	0.654	0 651
P_s	Stack Pressure, inches Hg	30.14	30.14	30.14	30.14
B_{ws}	Moisture, % by volume	4.7	4.8	4.7	4.7
$B_{ws(sat)}$	Moisture (at saturation), % by volume	12370.9	13745.1	13840.4	13318.8
V_{wstd}	Standard Water Vapor Volume, ft^3	1.911	1.986	1.925	1.941
$1\text{-}B_{ws}$	Dry Mole Fraction	0 953	0.952	0.953	0.953
M_d	Molecular Weight (d.b.), lb/lb•mole	29.24	29.36	29 36	29.32
M_s	Molecular Weight (w.b.), lb/lb•mole	28.71	28.81	28.83	28.78
V_s	Stack Gas Velocity, ft/s	136.8	137.5	137.6	137.3
A	Stack Area, ft^2	0.1	0.1	0.1	0.09
Q_a	Stack Gas Volumetric flow, acfm	716	720	720	719
Q_s	Stack Gas Volumetric flow, dscfm	337	334	334	335
Q_s	Stack Gas Volumetric flow, dscmm	10	9	9	9
I	Isokinetic Sampling Ratio, %	97.3	98.3	98.8	98.2

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	RUN DATE	***06/12/2002***	***06/12/2002***	***06/12/2002***	***Average***
	RUN TIME	***Time***	***Time***	***Time***	
	EMISSIONS DATA				
	Particulate Matter				
PM	Filter Weight Gain, mg	20.05	66 65	23	
PM	Beaker Weight Gain, mg	5.3	5.05	6.7	
PM	Total Catch, g	0.0254	0.0717	0.0297	0.0423
C_{PM}	**Concentration, gr/dscf**	**1.00E-02**	**2.84E-02**	**1.17E-02**	**1.67E-02**
C_{PM}	**Concentration, lb/dscf**	**1.43E-06**	**4.06E-06**	**1.67E-06**	**2.39E-06**
E_{PM}	**Emission Rate, lb/hr**	**0.03**	**0.08**	**0.03**	**0.05**
	Condensible Matter				
PM	Organic Gain, mg				
PM	Aqueous Gain, mg	16.6	21.7	17.2	
PM	Total Catch, g	0.0166	0.0217	0.0172	0.02
C_{PM}	**Concentration, gr/dscf**	**6.57E-03**	**8.59E-03**	**6.77E-03**	**7.31E-03**
C_{PM}	**Concentration, lb/dscf**	**9.39E-07**	**1.23E-06**	**9.67E-07**	**1.04E-06**
E_{PM}	**Emission Rate, lb/hr**	**1.90E-02**	**2.46E-02**	**1.94E-02**	**2.10E-02**
	Total Particulate Matter				
PM	Total Catch, g	4.20E-02	9.34E-02	4.69E-02	0.06
C_{PM}	**Concentration, gr/dscf**	**1.66E-02**	**3.70E-02**	**1.85E-02**	**2.40E-02**
C_{PM}	**Concentration, lb/dscf**	**2.37E-06**	**5.28E-06**	**2.64E-06**	**3.43E-06**
E_{PM}	**Emission Rate, lb/hr**	**4.80E-02**	**1.06E-01**	**5.28E-02**	**6.89E-02**

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	RUN NUMBER	***M5-75-1***	***M5-75-2***	***M5-75-3***	
	RUN DATE	***06/12/2002***	***06/12/2002***	***06/12/2002***	***Average***
	RUN TIME	***1120-1220***	***1237-1337***	***1350-1450***	
	MEASURED DATA				
P_{static}	Stack Static Pressure, inches H_2O	-2.50	-2.50	-2.50	-2.50
y	Meter Box Correction Factor	1.001	1.001	1.001	1.001
P_{bar}	Barometric Pressure, inches Hg	30 30	30 30	30.30	30.30
V_m	Sample Volume, ft^3	42.720	42.864	43.022	42.869
$Dp^{1/2}$	Average Square Root Dp, (in. $H_2O)^{1/2}$	1.6492	1.6454	1.6432	1.6459
DH	Avg Meter Orifice Pressure, in. H_2O	1.70	1.70	1.70	1.70
T_m	Average Meter Temperature, °F	81	82	86	83
T_s	Average Stack Temperature, °F	732	737	745	738
V_{lc}	Condensate Collected, ml	56.7	50.5	62.2	56.5
CO_2	Carbon Dioxide content, % by volume	6.0	6.0	6.0	6.0
O_2	Oxygen content, % by volume	13.0	13.0	13.0	13.0
N_2	Nitrogen content, % by volume	81.0	81.0	81.0	81.0
C_p	Pitot Tube Coefficient	0.99	0.99	0.99	0.99
	Circular Stack? 1=Y,0=N:	1	1	1	
As	Diameter or Dimensions, inches:	4.00	4.00	4.00	4.00
Q	Sample Run Duration, minutes	60	60	60	60
D_n	Nozzle Diameter, inches	0.174	0.178	0.178	0.177
	CALCULATED DATA				
A_n	Nozzle Area, ft^2	0 000165	0.000173	0.000173	0.000170
$V_{m(std)}$	Standard Meter Volume, ft^3	42.423	42.487	42.331	42.414
$V_{m(std)}$	Standard Meter Volume, m^3	1.201	1 203	1.199	1.201
Q_m	Average Sampling Rate, dscfm	0.707	0.708	0.706	0.707
P_s	Stack Pressure, inches Hg	30.12	30 12	30.12	30.12
B_{ws}	Moisture, % by volume	5.9	5.3	6.5	5.9
$B_{ws(sat)}$	Moisture (at saturation), % by volume	25834.9	26584.0	27813.4	26744.1
V_{wstd}	Standard Water Vapor Volume, ft^3	2.669	2 377	2.928	2.658
$1-B_{ws}$	Dry Mole Fraction	0.941	0.947	0.935	0.941
M_d	Molecular Weight (d.b.), lb/lb•mole	29.48	29.48	29.48	29.48
M_s	Molecular Weight (w.b.), lb/lb•mole	28.80	28 87	28.74	28.80
V_s	Stack Gas Velocity, ft/s	163.6	163.4	164.1	163.7
A	Stack Area, ft^2	0.1	0.1	0.1	0.09
Q_a	Stack Gas Volumetric flow, acfm	857	856	859	857
Q_s	Stack Gas Volumetric flow, dscfm	359	360	354	358
Q_s	Stack Gas Volumetric flow, dscmm	10	10	10	10
I	Isokinetic Sampling Ratio, %	104.0	99.5	100.6	101.4

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	RUN DATE	***06/12/2002***	***06/12/2002***	***06/12/2002***	***Average***
	RUN TIME	***1120-1220***	***1237-1337***	***1350-1450***	
	EMISSIONS DATA				
	Particulate Matter				
PM	Filter Weight Gain, mg	26.45	104.05	28.95	
PM	Beaker Weight Gain, mg	6.85	7 7	9.7	
PM	Total Catch, g	0.0333	0.1118	0.0387	0.0612
C_{PM}	**Concentration, gr/dscf**	**1.21E-02**	**4.06E-02**	**1.41E-02**	**2.23E-02**
C_{PM}	**Concentration, lb/dscf**	**1.73E-06**	**5.80E-06**	**2.01E-06**	**3.18E-06**
E_{PM}	**Emission Rate, lb/hr**	**3.73E-02**	**1.25E-01**	**4.28E-02**	**6.84E-02**
	Condensible Matter				
PM	Organic Gain, mg				
PM	Aqueous Gain, mg	26.8	20.8	23.1	
PM	Total Catch, g	0 0268	0.0208	0.0231	0.02
C_{PM}	**Concentration, gr/dscf**	**9.75E-03**	**7.55E-03**	**8.42E-03**	**8.58E-03**
C_{PM}	**Concentration, lb/dscf**	**1.39E-06**	**1.08E-06**	**1.20E-06**	**1.23E-06**
E_{PM}	**Emission Rate, lb/hr**	**3.00E-02**	**2.33E-02**	**2.56E-02**	**2.63E-02**
	Total Particulate Matter				
PM	Total Catch, g	6.01E-02	1.33E-01	6.18E-02	0.08
C_{PM}	**Concentration, gr/dscf**	**2.19E-02**	**4.81E-02**	**2.25E-02**	**3.08E-02**
C_{PM}	**Concentration, lb/dscf**	**3.12E-06**	**6.88E-06**	**3.22E-06**	**4.41E-06**
E_{PM}	**Emission Rate, lb/hr**	**6.73E-02**	**1.48E-01**	**6.84E-02**	**9.47E-02**

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	RUN DATE	***06/13/2002***	***06/13/2002***	***06/13/2002***	***Average***
	RUN TIME	***0730-0830***	***0845-0945***	***1000-1100***	
	MEASURED DATA				
P_{static}	Stack Static Pressure, inches H_2O	-2.50	-2.50	-2.50	-2.50
y	Meter Box Correction Factor	1.001	1.001	1.001	1.001
P_{bar}	Barometric Pressure, inches Hg	30.40	30.40	30.40	30.40
V_m	Sample Volume, ft^3	43.485	43.531	43.964	43.660
$Dp^{1/2}$	Average Square Root Dp, (in. $H_2O)^{1/2}$	1.7889	1.7889	1.7889	1.7889
DH	Avg Meter Orifice Pressure, in. H_2O	1.80	1.84	1.82	1.82
T_m	Average Meter Temperature, °F	63	75	80	73
T_s	Average Stack Temperature, °F	799	810	833	814
V_{lc}	Condensate Collected, ml	65.4	57.2	68.1	63.6
CO_2	Carbon Dioxide content, % by volume	7.0	7.0	7.0	7.0
O_2	Oxygen content, % by volume	11.5	11.5	11.5	11.5
N_2	Nitrogen content, % by volume	81.5	81.5	81.5	81.5
C_p	Pitot Tube Coefficient	0.99	0.99	0.99	0.99
	Circular Stack? 1=Y,0=N:	1	1	1	
As	Diameter or Dimensions, inches:	4.00	4.00	4.00	4.00
Q	Sample Run Duration, minutes	60	60	60	60
D_n	Nozzle Diameter, inches	0.178	0.178	0.178	0.178
	CALCULATED DATA				
A_n	Nozzle Area, ft^2	0.000173	0.000173	0.000173	0.000173
$V_{m(std)}$	Standard Meter Volume, ft^3	44.826	43.871	43.895	44.198
$V_{m(std)}$	Standard Meter Volume, m^3	1.269	1.242	1.243	1.252
Q_m	Average Sampling Rate, dscfm	0.747	0.731	0.732	0.737
P_s	Stack Pressure, inches Hg	30.22	30.22	30.22	30.22
B_{ws}	Moisture, % by volume	6.4	5.8	6.8	6.3
$B_{ws(sat)}$	Moisture (at saturation), % by volume	37019.7	39141.4	43836.8	39999.3
V_{wstd}	Standard Water Vapor Volume, ft^3	3.078	2.692	3.205	2.992
$1-B_{ws}$	Dry Mole Fraction	0.936	0.942	0.932	0.937
M_d	Molecular Weight (d.b.), lb/lb•mole	29.58	29.58	29.58	29.58
M_s	Molecular Weight (w.b.), lb/lb•mole	28.84	28.91	28.79	28.85
V_s	Stack Gas Velocity, ft/s	182.0	182.6	184.6	183.0
A	Stack Area, ft^2	0.1	0.1	0.1	0.09
Q_a	Stack Gas Volumetric flow, acfm	953	956	966	958
Q_s	Stack Gas Volumetric flow, dscfm	378	378	371	376
Q_s	Stack Gas Volumetric flow, dscmm	11	11	11	11
I	Isokinetic Sampling Ratio, %	100.0	97.7	99.5	99.1

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	EMISSIONS DATA				
	Particulate Matter				
PM	Filter Weight Gain, mg	24.05	95.85	24.15	
PM	Beaker Weight Gain, mg	9.05	7.35	7.85	
PM	Total Catch, g	0.0331	0.1032	0.0320	0.0561
C_{PM}	**Concentration, gr/dscf**	**1.14E-02**	**3.63E-02**	**1.13E-02**	**1.96E-02**
C_{PM}	**Concentration, lb/dscf**	**1.63E-06**	**5.19E-06**	**1.61E-06**	**2.81E-06**
E_{PM}	**Emission Rate, lb/hr**	**3.69E-02**	**1.18E-01**	**3.58E-02**	**6.34E-02**
	Condensible Matter				
PM	Organic Gain, mg				
PM	Aqueous Gain, mg	17.9	17.4	23.2	
PM	Total Catch, g	0.0179	0.0174	0.0232	0.02
C_{PM}	**Concentration, gr/dscf**	**6.16E-03**	**6.12E-03**	**8.16E-03**	**6.81E-03**
C_{PM}	**Concentration, lb/dscf**	**8.80E-07**	**8.74E-07**	**1.17E-06**	**9.73E-07**
E_{PM}	**Emission Rate, lb/hr**	**1.99E-02**	**1.98E-02**	**2.60E-02**	**2.19E-02**
	Total Particulate Matter				
PM	Total Catch, g	5.10E-02	1.21E-01	5.52E-02	0.08
C_{PM}	**Concentration, gr/dscf**	**1.76E-02**	**4.24E-02**	**1.94E-02**	**2.65E-02**
C_{PM}	**Concentration, lb/dscf**	**2.51E-06**	**6.06E-06**	**2.77E-06**	**3.78E-06**
E_{PM}	**Emission Rate, lb/hr**	**5.68E-02**	**1.37E-01**	**6.18E-02**	**8.53E-02**

PARTICULATE
ELMENDORF AFB

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	RUN NUMBER	***E-10-5-1***	***E-10-5-2***	***E-10-5-3***	
	RUN DATE	***06/25/2002***	***06/25/2002***	***06/25/2002***	***Average***
	RUN TIME	***0730-0830***	***0845-0945***	***1000-1100***	
	MEASURED DATA				
P_{static}	Stack Static Pressure, inches H_2O	-0 85	-0.85	-0.85	-0.85
y	Meter Box Correction Factor	1.001	1.001	1.001	1.001
P_{bar}	Barometric Pressure, inches Hg	29.90	29 90	29 90	29.90
V_m	Sample Volume, ft^3	52.196	43.840	44.452	46 829
$Dp^{1/2}$	Average Square Root Dp, (in. $H_2O)^{1/2}$	1.3450	1.1310	1.1314	1.2025
DH	Avg Meter Orifice Pressure, in. H_2O	2.37	1.70	1.70	1.92
T_m	Average Meter Temperature, °F	71	77	79	76
T_s	Average Stack Temperature, °F	440	450	453	448
V_{lc}	Condensate Collected, ml	43.5	35.8	37.1	38.8
CO_2	Carbon Dioxide content, % by volume	3.2	3.2	3.2	3.2
O_2	Oxygen content, % by volume	16.5	16.4	16.4	16 4
N_2	Nitrogen content, % by volume	80.3	80.4	80.4	80.4
C_p	Pitot Tube Coefficient	0.99	0.99	0.99	0.99
	Circular Stack? 1=Y,0=N:	1	1	1	
As	Diameter or Dimensions, inches	4.00	4.00	4.00	4.00
Q	Sample Run Duration, minutes	60	60	60	60
D_n	Nozzle Diameter, inches	0.201	0.201	0.201	0.201
	CALCULATED DATA				
A_n	Nozzle Area, ft^2	0.000220	0.000220	0.000220	0 000220
$V_{m(std)}$	Standard Meter Volume, ft^3	52.224	43.256	43.687	46.389
$V_{m(std)}$	Standard Meter Volume, m^3	1.479	1 225	1.237	1 314
Q_m	Average Sampling Rate, dscfm	0.870	0.721	0.728	0.773
P_s	Stack Pressure, inches Hg	29.84	29 84	29.84	29.84
B_{ws}	Moisture, % by volume	3.8	3.7	3.8	3.8
$B_{ws(sat)}$	Moisture (at saturation), % by volume	2705.2	3000.6	3093.9	2933.2
V_{wstd}	Standard Water Vapor Volume, ft^3	2.048	1.685	1.746	1.826
$1-B_{ws}$	Dry Mole Fraction	0.962	0.963	0.962	0.962
M_d	Molecular Weight (d.b.), lb/lb•mole	29.17	29.17	29.17	29.17
M_s	Molecular Weight (w.b.), lb/lb•mole	28.75	28.75	28.74	28.75
V_s	Stack Gas Velocity, ft/s	116.6	98.6	98.8	104.7
A	Stack Area, ft^2	0.09	0.09	0.09	0.09
Q_a	Stack Gas Volumetric flow, acfm	611	516	517	548
Q_s	Stack Gas Volumetric flow, dscfm	344	287	287	306
Q_s	Stack Gas Volumetric flow, dscmm	10	8	8	9
I	Isokinetic Sampling Ratio, %	100.4	99.4	100.6	100.1

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	RUN NUMBER	***E-10-5-1***	***E-10-5-2***	***E-10-5-3***	
	RUN DATE	***06/25/2002***	***06/25/2002***	***06/25/2002***	***Average***
	RUN TIME	***0730-0830***	***0845-0945***	***1000-1100***	
	EMISSIONS DATA				
	Particulate Matter				
PM	Filter Weight Gain, mg	7.55	64.5	7.55	
PM	Beaker Weight Gain, mg	3.6	3.35	3.05	
PM	Total Catch, g	0.0112	0.0679	0.0106	0.0299
C_{PM}	**Concentration, gr/dscf**	**3.29E-03**	**2.42E-02**	**3.74E-03**	**1.04E-02**
C_{PM}	**Concentration, lb/dscf**	**4.71E-07**	**3.46E-06**	**5.35E-07**	**1.49E-06**
E_{PM}	**Emission Rate, lb/hr**	**9.70E-03**	**5.96E-02**	**9.20E-03**	**2.62E-02**
	Condensible Matter				
PM	Organic Gain, mg				
PM	Aqueous Gain, mg	39.9	34.4	38.6	
PM	Total Catch, g	0.0399	0.0344	0 0386	0.0376
C_{PM}	**Concentration, gr/dscf**	**1.18E-02**	**1.23E-02**	**1.36E-02**	**1.26E-02**
C_{PM}	**Concentration, lb/dscf**	**1.68E-06**	**1.75E-06**	**1.95E-06**	**1.80E-06**
E_{PM}	**Emission Rate, lb/hr**	**3.47E-02**	**3.02E-02**	**3.35E-02**	**3.28E-02**
	Total Particulate Matter				
PM	Total Catch, g	5 11E-02	1.02E-01	4.92E-02	6.75E-02
C_{PM}	**Concentration, gr/dscf**	**1.51E-02**	**3.65E-02**	**1.74E-02**	**2.30E-02**
C_{PM}	**Concentration, lb/dscf**	**2.16E-06**	**5.21E-06**	**2.48E-06**	**3.28E-06**
E_{PM}	**Emission Rate, lb/hr**	**4.44E-02**	**8.99E-02**	**4.27E-02**	**5.90E-02**

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	RUN NUMBER / ***RUN DATE*** / ***RUN TIME***	***E-25-5-1*** / ***06/25/2002*** / ***1125-1225***	***E-25-5-2*** / ***06/25/2002*** / ***1245-1345***	***E-25-5-3*** / ***06/25/2002*** / ***1405-1505***	***Average***
	MEASURED DATA				
P_{static}	Stack Static Pressure, inches H_2O	-1.00	-1.10	-2.00	-1.37
y	Meter Box Correction Factor	1.001	1.001	1.001	1.001
P_{bar}	Barometric Pressure, inches Hg	29.90	29.90	29.90	29.90
V_m	Sample Volume, ft^3	50.176	49.657	50.116	49.983
$Dp^{1/2}$	Average Square Root Dp, (in. $H_2O)^{1/2}$	1.3450	1.3416	1.3416	1.3427
DH	Avg Meter Orifice Pressure, in. H_2O	2.19	2.20	2.18	2.19
T_m	Average Meter Temperature, °F	81	82	82	81
T_s	Average Stack Temperature, °F	550	553	555	553
V_{lc}	Condensate Collected, ml	58.7	46.5	44.3	49.8
CO_2	Carbon Dioxide content, % by volume	4.0	4.0	4.0	4.0
O_2	Oxygen content, % by volume	15.0	15.0	15.0	15.0
N_2	Nitrogen content, % by volume	81.0	81.0	81.0	81.0
C_p	Pitot Tube Coefficient	0.99	0.99	0.99	0.99
	Circular Stack? 1=Y,0=N:	1	1	1	
As	Diameter or Dimensions, inches	4.00	4.00	4.00	4.00
Q	Sample Run Duration, minutes	60	60	60	60
D_n	Nozzle Diameter, inches	0.201	0.201	0.201	0.201
	CALCULATED DATA				
A_n	Nozzle Area, ft^2	0.000220	0.000220	0.000220	0.000220
$V_{m(std)}$	Standard Meter Volume, ft^3	49.235	48.651	49.107	48.998
$V_{m(std)}$	Standard Meter Volume, m^3	1.394	1.378	1.391	1.387
Q_m	Average Sampling Rate, dscfm	0.821	0.811	0.818	0.817
P_s	Stack Pressure, inches Hg	29.83	29.82	29.75	29.80
B_{ws}	Moisture, % by volume	5.3	4.3	4.1	4.6
$B_{ws(sat)}$	Moisture (at saturation), % by volume	7495.0	7682.5	7825.5	7667.7
V_{wstd}	Standard Water Vapor Volume, ft^3	2.763	2.189	2.085	2.346
$1-B_{ws}$	Dry Mole Fraction	0.947	0.957	0.959	0.954
M_d	Molecular Weight (d.b.), lb/lb•mole	29.24	29.24	29.24	29.24
M_s	Molecular Weight (w.b.), lb/lb•mole	28.64	28.76	28.78	28.73
V_s	Stack Gas Velocity, ft/s	123.8	123.4	123.6	123.6
A	Stack Area, ft^2	0.087	0.087	0.087	0.087
Q_a	Stack Gas Volumetric flow, acfm	648	646	647	647
Q_s	Stack Gas Volumetric flow, dscfm	320	321	321	321
Q_s	Stack Gas Volumetric flow, dscmm	9	9	9	9
I	Isokinetic Sampling Ratio, %	101.7	100.0	101.0	100.9

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	RUN NUMBER	***E-25-5-1***	***E-25-5-2***	***E-25-5-3***	
	RUN DATE	***06/25/2002***	***06/25/2002***	***06/25/2002***	***Average***
	RUN TIME	***1125-1225***	***1245-1345***	***1405-1505***	
	EMISSIONS DATA				
	Particulate Matter				
PM	Filter Weight Gain, mg	10.2	69.2	13.2	
PM	Beaker Weight Gain, mg	3.85	4.2	4.75	
PM	Total Catch, g	0.0141	0.0734	0.0180	0.0351
C_{PM}	**Concentration, gr/dscf**	**4.40E-03**	**2.33E-02**	**5.64E-03**	**1.11E-02**
C_{PM}	**Concentration, lb/dscf**	**6.29E-07**	**3.33E-06**	**8.06E-07**	**1.59E-06**
E_{PM}	**Emission Rate, lb/hr**	**1.21E-02**	**6.41E-02**	**1.55E-02**	**3.06E-02**
	Condensible Matter				
PM	Organic Gain, mg				
PM	Aqueous Gain, mg	39	36.9	38.8	
PM	Total Catch, g	0.0390	0.0369	0.0388	0.0382
C_{PM}	**Concentration, gr/dscf**	**1.22E-02**	**1.17E-02**	**1.22E-02**	**1.20E-02**
C_{PM}	**Concentration, lb/dscf**	**1.75E-06**	**1.67E-06**	**1.74E-06**	**1.72E-06**
E_{PM}	**Emission Rate, lb/hr**	**3.35E-02**	**3.22E-02**	**3.36E-02**	**3.31E-02**
	Total Particulate Matter				
PM	Total Catch, g	5 31E-02	1.10E-01	5.68E-02	7.34E-02
C_{PM}	**Concentration, gr/dscf**	**1.66E-02**	**3.50E-02**	**1.78E-02**	2.31E-02
C_{PM}	**Concentration, lb/dscf**	**2.38E-06**	**5.00E-06**	**2.55E-06**	3.31E-06
E_{PM}	**Emission Rate, lb/hr**	**4.56E-02**	**9.63E-02**	**4.91E-02**	6.36E-02

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	RUN NUMBER	***E-50-5-1***	***E-50-5-2***	***E-50-5-3***	
	RUN DATE	***06/25/2002***	***06/25/2002***	***06/25/2002***	***Average***
	RUN TIME	***1520-1620***	***1645-1745***	***1800-1900***	
	MEASURED DATA				
P_{static}	Stack Static Pressure, inches H_2O	-3 00	-3.00	-3.00	-3.00
y	Meter Box Correction Factor	1.001	1.001	1.001	1.001
P_{bar}	Barometric Pressure, inches Hg	29.90	29 90	29.90	29 90
V_m	Sample Volume, ft^3	56.995	48.480	48.403	51.293
$Dp^{1/2}$	Average Square Root Dp, (in. $H_2O)^{1/2}$	1.6791	1.4520	1.4490	1.5267
DH	Avg Meter Orifice Pressure, in. H_2O	2.92	2.11	2.10	2.38
T_m	Average Meter Temperature, °F	82	81	83	82
T_s	Average Stack Temperature, °F	718	727	731	725
V_{lc}	Condensate Collected, ml	68.2	59.3	57.1	61.5
CO_2	Carbon Dioxide content, % by volume	4 0	5.9	5.9	5.3
O_2	Oxygen content, % by volume	15.0	12.8	12.8	13.5
N_2	Nitrogen content, % by volume	81.0	81 3	81.3	81.2
C_p	Pitot Tube Coefficient	0.99	0.99	0.99	0.99
	Circular Stack? 1=Y,0=N:	1	1	1	
As	Diameter or Dimensions, inches:	4.00	4.00	4.00	4.00
Q	Sample Run Duration, minutes	60	60	60	60
D_n	Nozzle Diameter, inches	0.201	0.201	0.201	0.201
	CALCULATED DATA				
A_n	Nozzle Area, ft^2	0.000220	0.000220	0.000220	0.000220
$V_{m(std)}$	Standard Meter Volume, ft^3	55.969	47.586	47 335	50.297
$V_{m(std)}$	Standard Meter Volume, m^3	1.585	1 347	1.340	1.424
Q_m	Average Sampling Rate, dscfm	0.933	0.793	0 789	0.838
P_s	Stack Pressure, inches Hg	29.68	29.68	29.68	29.68
B_{ws}	Moisture, % by volume	5.4	5.5	5.4	5.4
$B_{ws(sat)}$	Moisture (at saturation), % by volume	24165.8	25469.9	26064.9	25233.5
V_{wstd}	Standard Water Vapor Volume, ft^3	3.210	2.791	2.688	2.896
$1-B_{ws}$	Dry Mole Fraction	0 946	0.945	0 946	0.946
M_d	Molecular Weight (d.b.), lb/lb•mole	29.24	29.46	29.46	29 38
M_s	Molecular Weight (w b.), lb/lb•mole	28.63	28.82	28.84	28.76
V_s	Stack Gas Velocity, ft/s	167.3	144.8	144.7	152.2
A	Stack Area, ft^2	0.087	0.087	0.087	0.087
Q_a	Stack Gas Volumetric flow, acfm	876	758	757	797
Q_s	Stack Gas Volumetric flow, dscfm	368	316	315	333
Q_s	Stack Gas Volumetric flow, dscmm	10	9	9	9
I	Isokinetic Sampling Ratio, %	100.3	99.5	99.2	99.7

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	RUN NUMBER	***E-50-5-1***	***E-50-5-2***	***E-50-5-3***	
	RUN DATE	***06/25/2002***	***06/25/2002***	***06/25/2002***	***Average***
	RUN TIME	***1520-1620***	***1645-1745***	***1800-1900***	
	EMISSIONS DATA				
	Particulate Matter				
PM	Filter Weight Gain, mg	27.25	155.15	24.7	
PM	Beaker Weight Gain, mg	5.5	7.3	5.8	
PM	Total Catch, g	0.0328	0 1625	0.0305	0.0752
C_{PM}	**Concentration, gr/dscf**	**9.03E-03**	**5.27E-02**	**9.94E-03**	**2.39E-02**
C_{PM}	**Concentration, lb/dscf**	**1.29E-06**	**7.53E-06**	**1.42E-06**	**3.41E-06**
E_{PM}	**Emission Rate, lb/hr**	**2.85E-02**	**1.43E-01**	**2.69E-02**	**6.60E-02**
	Condensible Matter				
PM	Organic Gain, mg				
PM	Aqueous Gain, mg	43.1	39.6	46.2	
PM	Total Catch, g	0.0431	0 0396	0.0462	**4.30E-02**
C_{PM}	**Concentration, gr/dscf**	**1.19E-02**	**1.28E-02**	**1.51E-02**	**1.33E-02**
C_{PM}	**Concentration, lb/dscf**	**1.70E-06**	**1.83E-06**	**2.15E-06**	**1.89E-06**
E_{PM}	**Emission Rate, lb/hr**	**3.75E-02**	**3.48E-02**	**4.07E-02**	**3.76E-02**
	Total Particulate Matter				
PM	Total Catch, g	7.59E-02	2.02E-01	7.67E-02	1.18E-01
C_{PM}	**Concentration, gr/dscf**	**2.09E-02**	**6.55E-02**	**2.50E-02**	**3.71E-02**
C_{PM}	**Concentration, lb/dscf**	**2.99E-06**	**9.36E-06**	**3.57E-06**	**5.31E-06**
E_{PM}	**Emission Rate, lb/hr**	**6.60E-02**	**1.77E-01**	**6.75E-02**	**1.04E-01**

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	RUN NUMBER	***E-75-5-1***	***E-75-5-2***	***E-75-5-3***	
	RUN DATE	***06/26/2002***	***06/27/2002***	***06/27/2002***	***Average***
	RUN TIME	***1035-1135***	***1523-1623***	***1642-1753***	
	MEASURED DATA				
P_{static}	Stack Static Pressure, inches H_2O	-2.50	-2.00	-2.50	-2.33
y	Meter Box Correction Factor	1 001	1.001	1 001	1.001
P_{bar}	Barometric Pressure, inches Hg	29.90	29 90	29.90	29.90
V_m	Sample Volume, ft^3	44.979	43.365	43.452	43 932
$Dp^{1/2}$	Average Square Root Dp, (in $H_2O)^{1/2}$	1.7292	1.7030	1.7030	1.7117
DH	Avg Meter Orifice Pressure, in. H_2O	1 81	1.70	1 75	1.75
T_m	Average Meter Temperature, °F	72	78	79	76
T_s	Average Stack Temperature, °F	781	813	786	793
V_{lc}	Condensate Collected, ml	54.5	54.8	60.2	56.5
CO_2	Carbon Dioxide content, % by volume	6.2	6.6	6.3	6.4
O_2	Oxygen content, % by volume	11 8	12.0	12.4	12.1
N_2	Nitrogen content, % by volume	82 0	81.4	81.3	81 6
C_p	Pitot Tube Coefficient	0.99	0.99	0.99	0.99
	Circular Stack? 1=Y,0=N:	1	1	1	
As	Diameter or Dimensions, inches:	4.00	4.00	4.00	4.00
Q	Sample Run Duration, minutes	60	60	60	60
D_n	Nozzle Diameter, inches	0.180	0.180	0.180	0.180
	CALCULATED DATA				
A_n	Nozzle Area, ft^2	0.000177	0.000177	0.000177	0.000177
$V_{m(std)}$	Standard Meter Volume, ft^3	44.843	42.767	42.739	43.450
$V_{m(std)}$	Standard Meter Volume, m^3	1.270	1.211	1.210	1.230
Q_m	Average Sampling Rate, dscfm	0.747	0.713	0.712	0.724
P_s	Stack Pressure, inches Hg	29.72	29.75	29.72	29.73
B_{ws}	Moisture, % by volume	5.4	5.7	6.2	5.8
$B_{ws(sat)}$	Moisture (at saturation), % by volume	34284.1	40386.1	35195.8	36622.0
V_{wstd}	Standard Water Vapor Volume, ft^3	2.565	2.579	2.834	2.659
$1-B_{ws}$	Dry Mole Fraction	0.946	0.943	0.938	0.942
M_d	Molecular Weight (d.b.), lb/lb•mole	29.46	29.54	29.50	29 50
M_s	Molecular Weight (w.b.), lb/lb•mole	28.84	28 88	28.79	28.84
V_s	Stack Gas Velocity, ft/s	176.1	175.4	173.9	175.2
A	Stack Area, ft^2	0.087	0.087	0.087	0.087
Q_a	Stack Gas Volumetric flow, acfm	922	919	911	917
Q_s	Stack Gas Volumetric flow, dscfm	368	357	359	362
Q_s	Stack Gas Volumetric flow, dscmm	10	10	10	10
I	Isokinetic Sampling Ratio, %	100.2	98.6	97.9	98.9

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	RUN DATE	***06/26/2002***	***06/27/2002***	***06/27/2002***	***Average***
	RUN TIME	***1035-1135***	***1523-1623***	***1642-1753***	
	EMISSIONS DATA				
	Particulate Matter				
PM	Filter Weight Gain, mg	23.1	78.25	29.15	
PM	Beaker Weight Gain, mg	7.15	8.65	7.85	
PM	Total Catch, g	0 0303	0.0869	0.0370	0.0514
C_{PM}	**Concentration, gr/dscf**	**1.04E-02**	**3.14E-02**	**1.34E-02**	**1.84E-02**
C_{PM}	**Concentration, lb/dscf**	**1.49E-06**	**4.48E-06**	**1.91E-06**	**2.63E-06**
E_{PM}	**Emission Rate, lb/hr**	**3.29E-02**	**9.60E-02**	**4.11E-02**	**5.67E-02**
	Condensible Matter				
PM	Organic Gain, mg				
PM	Aqueous Gain, mg	46.1	55.3	57.6	
PM	Total Catch, g	0 0461	0.0553	0.0576	0.0530
C_{PM}	**Concentration, gr/dscf**	**1.59E-02**	**2.00E-02**	**2.08E-02**	**1.89E-02**
C_{PM}	**Concentration, lb/dscf**	**2.27E-06**	**2.85E-06**	**2.97E-06**	**2.70E-06**
E_{PM}	**Emission Rate, lb/hr**	**5.01E-02**	**6.11E-02**	**6.41E-02**	**5.84E-02**
	Total Particulate Matter				
PM	Total Catch, g	7.64E-02	1.42E-01	9.46E-02	1.04E-01
C_{PM}	**Concentration, gr/dscf**	**2.63E-02**	**5.13E-02**	**3.42E-02**	**3.72E-02**
C_{PM}	**Concentration, lb/dscf**	**3.75E-06**	**7.33E-06**	**4.88E-06**	**5.32E-06**
E_{PM}	**Emission Rate, lb/hr**	**8.30E-02**	**1.57E-01**	**1.05E-01**	**1.15E-01**

Summary of Stack Gas Parameters and Test Results
030174.0003.002
Elmendorf AFB
US EPA Test Method 5 - Particulate Matter
Generator Outlet

	RUN NUMBER	***E-100-5-1***	***E-100-5-2***	***E-100-5-3***	
	RUN DATE	***06/26/2002***	***06/27/2002***	***06/26/2002***	***Average***
	RUN TIME	***1020-1120***	***1205-1305***	***1325-1425***	
	MEASURED DATA				
P_{static}	Stack Static Pressure, inches H_2O	-3.30	-3.00	-3.00	-3 10
y	Meter Box Correction Factor	1.001	1.001	1.001	1.001
P_{bar}	Barometric Pressure, inches Hg	29 90	29.90	29 90	29.90
V_m	Sample Volume, ft^3	44.458	40.997	39.323	41.593
$Dp^{1/2}$	Average Square Root Dp, (in. $H_2O)^{1/2}$	1.7889	1 6677	1.5811	1 6792
DH	Avg Meter Orifice Pressure, in H_2O	1.90	1.61	1.40	1.64
T_m	Average Meter Temperature, °F	71	75	75	73
T_s	Average Stack Temperature, °F	830	848	841	840
V_{lc}	Condensate Collected, ml	80.6	55 1	57.9	64 5
CO_2	Carbon Dioxide content, % by volume	7.0	7.0	6.8	6 9
O_2	Oxygen content, % by volume	11.6	11.6	11.3	11.5
N_2	Nitrogen content, % by volume	81.4	81 4	81.9	81.6
C_p	Pitot Tube Coefficient	0.99	0 99	0.99	0.99
	Circular Stack? 1=Y,0=N:	1	1	1	
As	Diameter or Dimensions, inches:	4.00	4.00	4.00	4.00
Q	Sample Run Duration, minutes	60	60	60	60
D_n	Nozzle Diameter, inches	0.180	0 180	0.180	0.180
	CALCULATED DATA				
A_n	Nozzle Area, ft^2	0.000177	0.000177	0.000177	0.000177
$V_{m(std)}$	Standard Meter Volume, ft^3	44.403	40.649	38.967	41.340
$V_{m(std)}$	Standard Meter Volume, m^3	1.257	1.151	1 103	1.171
Q_m	Average Sampling Rate, dscfm	0.740	0.677	0.649	0.689
P_s	Stack Pressure, inches Hg	29.66	29.68	29.68	29.67
B_{ws}	Moisture, % by volume	7.9	6.0	6.5	6.8
$B_{ws(sat)}$	Moisture (at saturation), % by volume	44018.4	47943.3	46377.4	46113.0
V_{wstd}	Standard Water Vapor Volume, ft^3	3.794	2.594	2.725	3.038
$1-B_{ws}$	Dry Mole Fraction	0.921	0.940	0.935	0.932
M_d	Molecular Weight (d.b.), lb/lb•mole	29.58	29 58	29.54	29.57
M_s	Molecular Weight (w.b.), lb/lb•mole	28.67	28.89	28.79	28.78
V_s	Stack Gas Velocity, ft/s	186.5	174.3	165.1	175.3
A	Stack Area, ft^2	0.1	0.1	0.1	0.09
Q_a	Stack Gas Volumetric flow, acfm	976	913	865	918
Q_s	Stack Gas Volumetric flow, dscfm	365	343	325	344
Q_s	Stack Gas Volumetric flow, dscmm	10	10	9	10
I	Isokinetic Sampling Ratio, %	100.2	97.4	98.6	98.8

Summary of Stack Gas Parameters and Test Results
.030174.0003.002
Elmendorf AFB
US EPA Test Method 5 - Particulate Matter
Generator Outlet

	RUN NUMBER	***E-100-5-1***	***E-100-5-2***	***E-100-5-3***	
	RUN DATE	***06/26/2002***	***06/27/2002***	***06/26/2002***	***Average***
	RUN TIME	***1020-1120***	***1205-1305***	***1325-1425***	
	EMISSIONS DATA				
	<u>Particulate Matter</u>				
PM	Filter Weight Gain, mg	44.25	40.2	37.1	
PM	Beaker Weight Gain, mg	10.8	12.45	10.65	
PM	Total Catch, g	0.0551	0.0527	0.0478	0.0518
C_{PM}	**Concentration, gr/dscf**	**1.91E-02**	**2.00E-02**	**1.89E-02**	**1.93E-02**
C_{PM}	**Concentration, lb/dscf**	**2.73E-06**	**2.86E-06**	**2.70E-06**	**2.76E-06**
E_{PM}	**Emission Rate, lb/hr**	**0.06**	**0.06**	**0.05**	**0.06**
	<u>Condensible Matter</u>				
PM	Organic Gain, mg				
PM	Aqueous Gain, mg	50.2	40.2	45.7	
PM	Total Catch, g	0.0502	0.0402	0.0457	0.0454
C_{PM}	**Concentration, gr/dscf**	**1.74E-02**	**1.53E-02**	**1.81E-02**	**1.69E-02**
C_{PM}	**Concentration, lb/dscf**	**2.49E-06**	**2.18E-06**	**2.59E-06**	**2.42E-06**
E_{PM}	**Emission Rate, lb/hr**	**5.46E-02**	**4.49E-02**	**5.04E-02**	**5.00E-02**
	<u>Total Particulate Matter</u>				
PM	Total Catch, g	1.05E-01	9.29E-02	9.35E-02	9.72E-02
C_{PM}	**Concentration, gr/dscf**	**3.66E-02**	**3.52E-02**	**3.70E-02**	**3.63E-02**
C_{PM}	**Concentration, lb/dscf**	**5.23E-06**	**5.04E-06**	**5.29E-06**	**5.18E-06**
E_{PM}	**Emission Rate, lb/hr**	**1.14E-01**	**1.04E-01**	**1.03E-01**	**1.07E-01**

VOLATILE ORGANIC COMPOUNDS
TRAVIS/ELMENDORF

Summary of Stack Gas Parameters and Test Results
030174.0003.002
Travis and Elmendorf AFB
SW-846 Method 0030 - VOST

	RUN NUMBER	***T-0030-Comp***	***E-0030-Comp***	
	RUN DATE	***06/11/02,06/12/02***	***6/25/02- 6/27/02***	***Average***
	RUN TIME	***0856-1325,0753-1148***	***0732-1602, 1033-1058***	
	MEASURED DATA			
γ	Meter Box Correction Factor	0.971	0 966	0.969
P_{bar}	Barometric Pressure, inches Hg	30 30	29.90	30.10
P_{static}	Stack Static Pressure, inches H_2O	-2 01	-2.04	-2.03
V_m	Sample Volume, L	14 240	43.520	28.880
T_m	Average Meter Temperature, °F	84	68	76
C_p	Pitot Tube Coefficient	0.99	0 99	0.99
	Circular Stack? 1=Y,0=N:	1	1	
As	Diameter or Dimensions, inches:	4.00	4.00	4.00
F	Fuel Flow, lb/hr	4.41	5.30	4.86
Θ	Sample Run Duration, minutes	60	150	105
	CALCULATED DATA			
$V_{m(std)}$	Standard Meter Volume, dscl	13.649	42.184	27.917
$V_{m(std)}$	Standard Meter Volume, dscf	0.482	1.490	0 99
P_s	Stack Pressure, inches Hg	30.15	29.75	29.95
A	Stack Area, ft^2	0.09	0.09	0 09
Q_a	Stack Gas Volumetric flow, acfm	712	768	740
Q_s	Stack Gas Volumetric flow, dscfm	342	353	348
$Q_{s(cmm)}$	Stack Gas Volumetric flow, dscmm	10	10	10

Travis and Elmendorf AFB

030174.0003.002

	T-0030-Comp	E-0030-Comp	Average
Acetone			
Molecular Weight, g/g-mole	58.08	58.08	
Target Catch, µg	0.54	1.50	1.02
Concentration, mg/dscm [a]	3.92E-02	1.10E-01	0.07
Concentration, ppbvd [b]	1.62E+01	4.55E+01	30.87
Emission Rate, lb/hr [c]	5.02E-05	1.41E-04	0.00
Emission Rate, lb/1000 lb fuel	1.14E-02	2.65E-02	0.02
Benzene			
Molecular Weight, g/g-mole	78.11	78.11	
Target Catch, µg	{4.56}	{6.90}	5.73
Concentration, mg/dscm [a]	{3.34E-01}	{5.05E-01}	0.42
Concentration, ppbvd [b]	{1.03E+02}	{1.56E+02}	129.27
Emission Rate, lb/hr [c]	{4.28E-04}	{6.48E-04}	0.00
Emission Rate, lb/1000 lb fuel	9.70E-02	1.22E-01	0.11
Bromodichloromethane			
Molecular Weight, g/g-mole	163.83	163.83	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*7.33E-04*	*7.33E-04*	*0.00*
Concentration, ppbvd [b]	*1.08E-01*	*1.08E-01*	*0.11*
Emission Rate, lb/hr [c]	*9.39E-07*	*9.39E-07*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.13E-04*	*1.77E-04*	*0.00*
Bromoform			
Molecular Weight, g/g-mole	252.73	252.73	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*7.33E-04*	*7.33E-04*	*0.00*
Concentration, ppbvd [b]	*6.97E-02*	*6.97E-02*	*0.07*
Emission Rate, lb/hr [c]	*9.39E-07*	*9.39E-07*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.13E-04*	*1.77E-04*	*0.00*

[a] Milligrams per dry standard cubic meter at 68° F (20° C) and 1 atm.

[b] Parts per billion by volume.

[c] Pounds per hour

030174.0003.002

	T-0030-Comp	E-0030-Comp	Average
Bromomethane			
Molecular Weight, g/g-mole	94.94	94.94	
Target Catch, µg	0.05	1.40	0.73
Concentration, mg/dscm [a]	3.81E-03	1.03E-01	0.05
Concentration, ppbvd [b]	9.65E-01	2.60E+01	13.48
Emission Rate, lb/hr [c]	4.88E-06	1.31E-04	0.00
Emission Rate, lb/1000 lb fuel	1.11E-03	2.48E-02	0.01
2-Butanone			
Molecular Weight, g/g-mole	72.11	72.11	
Target Catch, µg	0.28	1.30	0.79
Concentration, mg/dscm [a]	2.05E-02	9.52E-02	0.06
Concentration, ppbvd [b]	6.84E+00	3.18E+01	19.31
Emission Rate, lb/hr [c]	2.63E-05	1.22E-04	0.00
Emission Rate, lb/1000 lb fuel	5.96E-03	2.30E-02	0.01
1,3 Butadiene			
Molecular Weight, g/g-mole	54.09	54.09	
Target Catch, µg	*0.05*	*0.05*	*0.05*
Concentration, mg/dscm [a]	*3.66E-03*	*3.66E-03*	*0.00*
Concentration, ppbvd [b]	*1.63E+00*	*1.63E+00*	*1.63*
Emission Rate, lb/hr [c]	*4.69E-06*	*4.69E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*1.06E-03*	*8.85E-04*	*0.00*
Carbon disulfide			
Molecular Weight, g/g-mole	76.13	76.13	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*7.33E-04*	*7.33E-04*	*0.00*
Concentration, ppbvd [b]	*2.31E-01*	*2.31E-01*	*0.23*
Emission Rate, lb/hr [c]	*9.39E-07*	*9.39E-07*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.13E-04*	*1.77E-04*	*0.00*

[a] Milligrams per dry standard cubic meter at 68° F (20° C) and 1 atm

[b] Parts per billion by volume

[c] Pounds per hour

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	T-0030-Comp	E-0030-Comp	Average
Carbon tetrachloride			
Molecular Weight, g/g-mole	153.84	153 84	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*7.33E-04*	*7.33E-04*	*0.00*
Concentration, ppbvd [b]	*1.15E-01*	*1 15E-01*	*0.11*
Emission Rate, lb/hr [c]	*9 39E-07*	*9.39E-07*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.13E-04*	*1.77E-04*	*0.00*
Chlorobenzene			
Molecular Weight, g/g-mole	112.56	112.56	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*1 03E-03*	*1.03E-03*	*0.00*
Concentration, ppbvd [b]	*2.19E-01*	*2.19E-01*	*0.22*
Emission Rate, lb/hr [c]	*1.31E-06*	*1 31E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.98E-04*	*2.48E-04*	*0.00*
Chlorodibromomethane			
Molecular Weight, g/g-mole	208 28	208.28	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*1 03E-03*	*1.03E-03*	*0.00*
Concentration, ppbvd [b]	*1.18E-01*	*1.18E-01*	*0.12*
Emission Rate, lb/hr [c]	*1.31E-06*	*1.31E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*2 98E-04*	*2.48E-04*	*0.00*
Chloroethane			
Molecular Weight, g/g-mole	65.51	65.51	
Target Catch, µg	*{0.01}*	*{0.01}*	*0.01*
Concentration, mg/dscm [a]	*{1.03E-03}*	*{1.03E-03}*	*0.00*
Concentration, ppbvd [b]	*{3.77E-01}*	*{3.77E-01}*	*0.38*
Emission Rate, lb/hr [c]	*{1 31E-06}*	*{1 31E-06}*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.98E-04*	*2.48E-04*	*0.00*
Chloroform			
Molecular Weight, g/g-mole	119.39	119.39	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*1.03E-03*	*1.03E-03*	*0.00*
Concentration, ppbvd [b]	*2.07E-01*	*2 07E-01*	*0.21*
Emission Rate, lb/hr [c]	*1.31E-06*	*1 31E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.98E-04*	*2.48E-04*	*0.00*

[a] Milligrams per dry standard cubic meter at 68° F (20° C) and 1 atm.

[b] Parts per billion by volume.

[c] Pounds per hour

030174.0003.002

	T-0030-Comp	E-0030-Comp	Average
Chloromethane			
Molecular Weight, g/g-mole	50.49	50.49	
Target Catch, µg	0.08	2.40	1 24
Concentration, mg/dscm [a]	5.64E-03	1 76E-01	0.09
Concentration, ppbvd [b]	2.69E+00	8 38E+01	43.23
Emission Rate, lb/hr [c]	7.23E-06	2.25E-04	0.00
Emission Rate, lb/1000 lb fuel	1.64E-03	4.25E-02	0.02
1,1-Dichloroethane			
Molecular Weight, g/g-mole	98.96	98.96	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*1.03E-03*	*1.03E-03*	*0.00*
Concentration, ppbvd [b]	*2.49E-01*	*2.49E-01*	*0.25*
Emission Rate, lb/hr [c]	*1.31E-06*	*1 31E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*2 98E-04*	*2.48E-04*	*0.00*
1,2-Dichloroethane			
Molecular Weight, g/g-mole	98 96	98 96	
Target Catch, µg	*0 01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*1.03E-03*	*1.03E-03*	*0.00*
Concentration, ppbvd [b]	*2.49E-01*	*2 49E-01*	*0.25*
Emission Rate, lb/hr [c]	*1 31E-06*	*1.31E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.98E-04*	*2.48E-04*	*0.00*
1,1-Dichloroethene			
Molecular Weight, g/g-mole	96.94	96 94	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*1 03E-03*	*1 03E-03*	*0.00*
Concentration, ppbvd [b]	*2 54E-01*	*2.54E-01*	*0.25*
Emission Rate, lb/hr [c]	*1.31E-06*	*1.31E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.98E-04*	*2.48E-04*	*0.00*

[a] Milligrams per dry standard cubic meter at 68° F (20° C) and 1 atm.

[b] Parts per billion by volume.

[c] Pounds per hour

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	T-0030-Comp	E-0030-Comp	Average
cis-1,2-Dichloroethene			
Molecular Weight, g/g-mole	96.94	96.94	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*1.03E-03*	*1.03E-03*	*0.00*
Concentration, ppbvd [b]	*2.54E-01*	*2.54E-01*	*0.25*
Emission Rate, lb/hr [c]	*1.31E-06*	*1.31E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.98E-04*	*2.48E-04*	*0.00*
trans-1,2-Dichloroethene			
Molecular Weight, g/g-mole	96.94	96.94	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*1.03E-03*	*1.03E-03*	*0.00*
Concentration, ppbvd [b]	*2.54E-01*	*2.54E-01*	*0.25*
Emission Rate, lb/hr [c]	*1.31E-06*	*1.31E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.98E-04*	*2.48E-04*	*0.00*
1,2-Dichloropropane			
Molecular Weight, g/g-mole	112.99	112.99	
Target Catch, µg	*{0.01}*	*{0.01}*	*0.01*
Concentration, mg/dscm [a]	*{1.03E-03}*	*{1.03E-03}*	*0.00*
Concentration, ppbvd [b]	*{2.18E-01}*	*{2.18E-01}*	*0.22*
Emission Rate, lb/hr [c]	*{1.31E-06}*	*{1.31E-06}*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.98E-04*	*2.48E-04*	*0.00*

[a] Milligrams per dry standard cubic meter at 68° F (20° C) and 1 atm.

[b] Parts per billion by volume.

[c] Pounds per hour

030174.0003.002

	T-0030-Comp	E-0030-Comp	Average
cis-1,3-Dichloropropene			
Molecular Weight, g/g-mole	110.97	110.97	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*1 03E-03*	*1.03E-03*	*0.00*
Concentration, ppbvd [b]	*2.22E-01*	*2.22E-01*	*0.22*
Emission Rate, lb/hr [c]	*1.31E-06*	*1 31E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.98E-04*	*2 48E-04*	*0.00*
trans-1,3-Dichloropropene			
Molecular Weight, g/g-mole	110.97	110.97	
Target Catch, µg	*{0.01}*	*{0.01}*	*0.01*
Concentration, mg/dscm [a]	*{1 03E-03}*	*{1 03E-03}*	*0.00*
Concentration, ppbvd [b]	*{2.22E-01}*	*{2.22E-01}*	*0.22*
Emission Rate, lb/hr [c]	*{1.31E-06}*	*{1.31E-06}*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.98E-04*	*2.48E-04*	*0.00*
Ethylbenzene			
Molecular Weight, g/g-mole	106.17	106.17	
Target Catch, µg	{0.57}	{3 00}	1.79
Concentration, mg/dscm [a]	{4.18E-02}	{2.20E-01}	0.13
Concentration, ppbvd [b]	{9.46E+00}	{4.98E+01}	29.63
Emission Rate, lb/hr [c]	{5 35E-05}	{2.82E-04}	0.00
Emission Rate, lb/1000 lb fuel	1.21E-02	5 31E-02	0.03
2-Hexanone			
Molecular Weight, g/g-mole	100.16	100.16	
Target Catch, µg	*0.05*	*0.05*	*0.05*
Concentration, mg/dscm [a]	*3.66E-03*	*3.66E-03*	*0.00*
Concentration, ppbvd [b]	*8.80E-01*	*8.80E-01*	*0.88*
Emission Rate, lb/hr [c]	*4.69E-06*	*4.69E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*1.06E-03*	*8.85E-04*	*0.00*

[a] Milligrams per dry standard cubic meter at 68° F (20° C) and 1 atm.

[b] Parts per billion by volume.

[c] Pounds per hour.

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	T-0030-Comp	E-0030-Comp	Average
Methylene chloride			
Molecular Weight, g/g-mole	84.93	84.93	
Target Catch, µg	{0.17}	{5.20}	2.69
Concentration, mg/dscm [a]	{1.27E-02}	{3.81E-01}	0.20
Concentration, ppbvd [b]	{3.61E+00}	{1.08E+02}	55.75
Emission Rate, lb/hr [c]	{1.63E-05}	{4.88E-04}	0.00
Emission Rate, lb/1000 lb fuel	3.70E-03	9.20E-02	0.05
4-Methyl-2-pentanone			
Molecular Weight, g/g-mole	100.16	100.16	
Target Catch, µg	*0.05*	*0.05*	*0.05*
Concentration, mg/dscm [a]	*3.66E-03*	*3.66E-03*	*0.00*
Concentration, ppbvd [b]	*8.80E-01*	*8.80E-01*	*0.88*
Emission Rate, lb/hr [c]	*4.69E-06*	*4.69E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*1.06E-03*	*8.85E-04*	*0.00*
Styrene			
Molecular Weight, g/g-mole	104.15	104.15	
Target Catch, µg	0.04	*0.01*	*0.02*
Concentration, mg/dscm [a]	2.71E-03	*7.33E-04*	*0.00*
Concentration, ppbvd [b]	6.26E-01	*1.69E-01*	*0.40*
Emission Rate, lb/hr [c]	3.47E-06	*9.39E-07*	*0.00*
Emission Rate, lb/1000 lb fuel	7.87E-04	*1.77E-04*	*0.00*

[a] Milligrams per dry standard cubic meter at 68° F (20° C) and 1 atm.

[b] Parts per billion by volume.

[c] Pounds per hour

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	T-0030-Comp	E-0030-Comp	Average
1,1,2,2-Tetrachloroethane			
Molecular Weight, g/g-mole	167 85	167.85	
Target Catch, µg	*0.01*	*0 01*	*0.01*
Concentration, mg/dscm [a]	*1.03E-03*	*1.03E-03*	*0.00*
Concentration, ppbvd [b]	*1.47E-01*	*1.47E-01*	*0.15*
Emission Rate, lb/hr [c]	*1 31E-06*	*1.31E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*2 98E-04*	*2.48E-04*	*0.00*
Tetrachloroethene			
Molecular Weight, g/g-mole	165.83	165.83	
Target Catch, µg	*0 01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*1.03E-03*	*1.03E-03*	*0.00*
Concentration, ppbvd [b]	*1.49E-01*	*1.49E-01*	*0.15*
Emission Rate, lb/hr [c]	*1.31E-06*	*1.31E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.98E-04*	*2 48E-04*	*0.00*
Toluene			
Molecular Weight, g/g-mole	94.14	94.14	
Target Catch, µg	2.80	6.40	4.60
Concentration, mg/dscm [a]	2.05E-01	4.69E-01	0.34
Concentration, ppbvd [b]	5.24E+01	1.20E+02	86.11
Emission Rate, lb/hr [c]	2.63E-04	6.01E-04	0.00
Emission Rate, lb/1000 lb fuel	5.96E-02	1.13E-01	0.09

[a] Milligrams per dry standard cubic meter at 68° F (20° C) and 1 atm.

[b] Parts per billion by volume.

[c] Pounds per hour

030174.0003.002

	T-0030-Comp	E-0030-Comp	Average
1,1,1-Trichloroethane			
Molecular Weight, g/g-mole	133.40	133.40	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*1.03E-03*	*1.03E-03*	*0.00*
Concentration, ppbvd [b]	*1.85E-01*	*1.85E-01*	*0.18*
Emission Rate, lb/hr [c]	*1.31E-06*	*1.31E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.98E-04*	*2.48E-04*	*0.00*
1,1,2-Trichloroethane			
Molecular Weight, g/g-mole	133.40	133.40	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*1.03E-03*	*1.03E-03*	*0.00*
Concentration, ppbvd [b]	*1.85E-01*	*1.85E-01*	*0.18*
Emission Rate, lb/hr [c]	*1.31E-06*	*1.31E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.98E-04*	*2.48E-04*	*0.00*
Trichloroethene			
Molecular Weight, g/g-mole	131.39	131.39	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*1.03E-03*	*1.03E-03*	*0.00*
Concentration, ppbvd [b]	*1.88E-01*	*1.88E-01*	*0.19*
Emission Rate, lb/hr [c]	*1.31E-06*	*1.31E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.98E-04*	*2.48E-04*	*0.00*
Trichlorofluoromethane (Freon 11)			
Molecular Weight, g/g-mole	137.37	137.37	
Target Catch, µg	*0.01*	*0.01*	*0.01*
Concentration, mg/dscm [a]	*7.33E-04*	*7.33E-04*	*0.00*
Concentration, ppbvd [b]	*1.28E-01*	*1.28E-01*	*0.13*
Emission Rate, lb/hr [c]	*9.39E-07*	*9.39E-07*	*0.00*
Emission Rate, lb/1000 lb fuel	*2.13E-04*	*1.77E-04*	*0.00*

[a] Milligrams per dry standard cubic meter at 68° F (20° C) and 1 atm.

[b] Parts per billion by volume.

[c] Pounds per hour

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	T-0030-Comp	E-0030-Comp	Average
o-Xylene			
Molecular Weight, g/g-mole	106.17	106.17	
Target Catch, µg	0.76	4.10	2.43
Concentration, mg/dscm [a]	1 07E-03	1 07E-03	0.00
Concentration, ppbvd [b]	1.26E+01	6.81E+01	40 33
Emission Rate, lb/hr [c]	7.13E-05	3.85E-04	0 00
Emission Rate, lb/1000 lb fuel	1 62E-02	7.25E-02	0 04
m-Xylene & p-Xylene			
Molecular Weight, g/g-mole	106 17	106.17	
Target Catch, µg	1 90	6.30	4.10
Concentration, mg/dscm [a]	1.39E-01	4.62E-01	0.30
Concentration, ppbvd [b]	3.15E+01	1.05E+02	68.05
Emission Rate, lb/hr [c]	1.78E-04	5.91E-04	0.00
Emission Rate, lb/1000 lb fuel	4.04E-02	1.11E-01	0.08
Vinyl acetate			
Molecular Weight, g/g-mole	86.09	86.09	
Target Catch, µg	*0.05*	*0.05*	*0.05*
Concentration, mg/dscm [a]	*3.66E-03*	*3.66E-03*	*0 00*
Concentration, ppbvd [b]	*1.02E+00*	*1 02E+00*	*1.02*
Emission Rate, lb/hr [c]	*4 69E-06*	*4.69E-06*	*0.00*
Emission Rate, lb/1000 lb fuel	*1.06E-03*	*8.85E-04*	*0.00*

[a] Milligrams per dry standard cubic meter at 68° F (20° C) and 1 atm

[b] Parts per billion by volume.

[c] Pounds per hour

POLYNUCLEAR AROMATIC HYDROCARBONS
TRAVIS/ELMENDORF

Summary of Stack Gas Parameters and Test Results
030174.0003.002
Travis and Elmendorf AFB
PAH

	RUN NUMBER	***T-PAH-Comp***	***E-PAH-Comp***	
	RUN DATE	***06/11/02,06/12/02***	***6/25/02-6/27/02***	***Average***
	RUN TIME	***0856-1325,0753-1148***	***0732-1602, 1033-1058***	
	MEASURED DATA			
P_{static}	Stack Static Pressure, inches H_2O	-2.01	-2.04	-2.03
y	Meter Box Correction Factor	1.273	1.086	1.180
P_{bar}	Barometric Pressure, inches Hg	30.30	29.90	30.10
V_m	Sample Volume, L^3	13.520	46.040	29.780
$Dp^{1/2}$	Average Square Root Dp, (in. H_2O)$^{1/2}$	1.4560	1.5371	1.4966
T_m	Average Meter Temperature, °F	84	69	77
T_s	Average Stack Temperature, °F	594	621	608
CO_2	Carbon Dioxide content, % by volume	4.0	3.0	3.5
O_2	Oxygen content, % by volume	15.0	17.0	16.0
N_2	Nitrogen content, % by volume	81.0	80.0	80.5
C_p	Pitot Tube Coefficient	0.99	0.99	0.99
	Circular Stack? 1=Y,0=N:	1	1	
As	Diameter or Dimensions, inches:	4.00	4.00	4.00
F	Fuel Flow, lb/hr	4.41	5.30	
Q	Sample Run Duration, minutes	60	150	105
	CALCULATED DATA			
$V_{m(std)}$	Standard Meter Volume, L^3	16.922	49.871	33.397
$V_{m(std)}$	Standard Meter Volume, ft^3	0.598	1.761	1.179
P_s	Stack Pressure, inches Hg	30.15	29.75	29.95
B_{ws}	Moisture, % by volume	1.4	1.9	1.7
$1-B_{ws}$	Dry Mole Fraction	0.986	0.981	0.984
M_d	Molecular Weight (d.b.), lb/lb•mole	29.24	29.16	29.20
M_s	Molecular Weight (w.b.), lb/lb•mole	29.08	28.95	29.02
V_s	Stack Gas Velocity, ft/s	135.1	145.8	140.4
A	Stack Area, ft^2	0.1	0.1	0.09
Q_a	Stack Gas Volumetric flow, acfm	712	768	740
Q_s	Stack Gas Volumetric flow, dscfm	342	353	348
Q_s	Stack Gas Volumetric flow, dscmm	10	10	10
	Naphthalene			
	Analysis, ug/sample	*2.0*	12.0	7.0
	Molecular Weight, MW	128.2	128.2	128.2
	Concentration, lb/dscf	**7.36E-09**	**1.50E-08**	**0.0**
ppmdv	**Parts Per Million, Wet Basis**	**2.21E-02**	**4.51E-02**	**3.36E-02**
	Parts Per Million, Dry Basis	**2.24E-02**	**4.59E-02**	**3.42E-02**
	Emission Rate, lb/hr	**1.53E-04**	**3.24E-04**	**2.38E-04**
	Emission Rate, lb/1000 lb fuel	3.47E-02	6.10E-02	**4.79E-02**
	2-Methylnaphthalene			

Summary of Stack Gas Parameters and Test Results
030174.0003.002
Travis and Elmendorf AFB
PAH

	RUN NUMBER RUN DATE RUN TIME	T-PAH-Comp 06/11/02,06/12/02 0856-1325,0753-1148	E-PAH-Comp 6/25/02-6/27/02 0732-1602, 1033-1058	Average
	Analysis, ug/sample	2.0	12.0	7.0
	Molecular Weight, MW	142.2	142.2	142.2
	Concentration, lb/dscf	7.36E-09	1.50E-08	0.0
ppmdv	Parts Per Million, Dry Basis	2.00E-02	4.06E-02	3.03E-02
	Parts Per Million, Dry Basis	2.02E-02	4.14E-02	3.08E-02
	Emission Rate, lb/hr	1.53E-04	3.24E-04	2.38E-04
	Emission Rate, lb/1000 lb fuel	3.47E-02	6.10E-02	4.79E-02
	2-Chloronaphthalene			
	Analysis, ug/sample	2.0	1.0	1.5
	Molecular Weight, MW	162.6	162.6	162.6
	Concentration, lb/dscf	7.36E-09	1.25E-09	0.0
ppmdv	Parts Per Million, Wet Basis	1.74E-02	2.96E-03	1.02E-02
	Parts Per Million, Dry Basis	1.77E-02	3.02E-03	1.04E-02
	Emission Rate, lb/hr	1.53E-04	2.70E-05	9.01E-05
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	1.99E-02
	Acenaphthene			
	Analysis, ug/sample	2.0	1.0	1.5
	Molecular Weight, MW	154.2	154.2	154.2
	Concentration, lb/dscf	7.36E-09	1.25E-09	0.0
ppmdv	Parts Per Million, Dry Basis	1.84E-02	3.12E-03	1.08E-02
	Parts Per Million, Dry Basis	1.87E-02	3.18E-03	1.09E-02
	Emission Rate, lb/hr	1.53E-04	2.70E-05	9.01E-05
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	1.99E-02
	Acenaphthylene			
	Analysis, ug/sample	2.0	1.0	1.5
	Molecular Weight, MW	152.2	152.2	152.2
	Concentration, lb/dscf	7.36E-09	1.25E-09	0.0
ppmdv	Parts Per Million, Wet Basis	1.86E-02	3.16E-03	1.09E-02
	Parts Per Million, Dry Basis	1.89E-02	3.22E-03	1.11E-02
	Emission Rate, lb/hr	1.53E-04	2.70E-05	9.01E-05
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	1.99E-02
	Fluorene			
	Analysis, ug/sample	2.0	1.0	1.5
	Molecular Weight, MW	166.2	166.2	166.2
	Concentration, lb/dscf	7.36E-09	1.25E-09	0.0
ppmdv	Parts Per Million, Dry Basis	1.71E-02	2.90E-03	9.98E-03
	Parts Per Million, Dry Basis	1.73E-02	2.95E-03	1.01E-02
	Emission Rate, lb/hr	1.53E-04	2.70E-05	9.01E-05
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	1.99E-02

Summary of Stack Gas Parameters and Test Results
030174.0003.002
Travis and Elmendorf AFB
PAH

	RUN NUMBER RUN DATE RUN TIME	T-PAH-Comp 06/11/02,06/12/02 0856-1325,0753-1148	E-PAH-Comp 6/25/02-6/27/02 0732-1602, 1033-1058	Average
	Phenanthrene			
	Analysis, ug/sample	2.0	1.0	1.5
	Molecular Weight, MW	178.0	178.0	178.0
	Concentration, lb/dscf	7.36E-09	1.25E-09	0.0
ppmdv	Parts Per Million, Dry Basis	1.59E-02	2.70E-03	9.32E-03
	Parts Per Million, Dry Basis	1.62E-02	2.76E-03	9.46E-03
	Emission Rate, lb/hr	1.53E-04	2.70E-05	9.01E-05
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	1.99E-02
	Anthracene			
	Analysis, ug/sample	2.0	1.0	1.5
	Molecular Weight, MW	178.2	178.2	178.2
	Concentration, lb/dscf	7.36E-09	1.25E-09	0.0
ppmdv	Parts Per Million, Dry Basis	1.59E-02	2.70E-03	9.31E-03
	Parts Per Million, Dry Basis	1.61E-02	2.75E-03	9.45E-03
	Emission Rate, lb/hr	1.53E-04	2.70E-05	9.01E-05
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	1.99E-02
	Fluoranthene			
	Analysis, ug/sample	2.0	1.0	1.5
	Molecular Weight, MW	202.3	202.3	202.3
	Concentration, lb/dscf	7.36E-09	1.25E-09	0.0
ppmdv	Parts Per Million, Dry Basis	1.40E-02	2.38E-03	8.20E-03
	Parts Per Million, Dry Basis	1.42E-02	2.43E-03	8.32E-03
	Emission Rate, lb/hr	1.53E-04	2.70E-05	9.01E-05
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	1.99E-02
	Pyrene			
	Analysis, ug/sample	2.0	1.0	1.5
	Molecular Weight, MW	202.3	202.3	202.3
	Concentration, lb/dscf	7.36E-09	1.25E-09	0.0
ppmdv	Parts Per Million, Dry Basis	1.40E-02	2.38E-03	8.20E-03
	Parts Per Million, Dry Basis	1.42E-02	2.43E-03	8.32E-03
	Emission Rate, lb/hr	1.53E-04	2.70E-05	9.01E-05
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	1.99E-02
	Chrysene			
	Analysis, ug/sample	2.0	1.0	1.5
	Molecular Weight, MW	228.3	228.3	228.3
	Concentration, lb/dscf	7.36E-09	1.25E-09	0.0
ppmdv	Parts Per Million, Dry Basis	1.24E-02	2.11E-03	7.27E-03
	Parts Per Million, Dry Basis	1.26E-02	2.15E-03	7.38E-03
	Emission Rate, lb/hr	1.53E-04	2.70E-05	9.01E-05
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	1.99E-02
	Benzo(a)anthracene			

Summary of Stack Gas Parameters and Test Results
030174.0003.002
Travis and Elmendorf AFB
PAH

	RUN NUMBER	***T-PAH-Comp***	***E-PAH-Comp***	
	RUN DATE	***06/11/02,06/12/02***	***6/25/02-6/27/02***	***Average***
	RUN TIME	***0856-1325,0753-1148***	***0732-1602, 1033-1058***	
	Analysis, *u*g/sample	*2.0*	*1.0*	**1.5**
	Molecular Weight, MW	228.3	228.3	**228.3**
	Concentration, lb/dscf	**7.36E-09**	**1.25E-09**	**0.0**
ppmdv	**Parts Per Million, Dry Basis**	**1.24E-02**	**2.11E-03**	**7.27E-03**
	Parts Per Million, Dry Basis	**1.26E-02**	**2.15E-03**	**7.38E-03**
	Emission Rate, lb/hr	**1.53E-04**	**2.70E-05**	**9.01E-05**
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	**1.99E-02**
	Benzo(b)fluoranthene			
	Analysis, *u*g/sample	*2.0*	*1.0*	**1.5**
	Molecular Weight, MW	252.3	252.3	**252.3**
	Concentration, lb/dscf	**7.36E-09**	**1.25E-09**	**0.0**
ppmdv	**Parts Per Million, Dry Basis**	**1.12E-02**	**1.91E-03**	**6.58E-03**
	Parts Per Million, Dry Basis	**1.14E-02**	**1.94E-03**	**6.67E-03**
	Emission Rate, lb/hr	**1.53E-04**	**2.70E-05**	**9.01E-05**
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	**1.99E-02**
	Benzo(k)fluoranthene			
	Analysis, *u*g/sample	*2.0*	*1.0*	**1.5**
	Molecular Weight, MW	252.3	252.3	**252.3**
	Concentration, lb/dscf	**7.36E-09**	**1.25E-09**	**0.0**
ppmdv	**Parts Per Million, Dry Basis**	**1.12E-02**	**1.91E-03**	**6.58E-03**
	Parts Per Million, Dry Basis	**1.14E-02**	**1.94E-03**	**6.67E-03**
	Emission Rate, lb/hr	**1.53E-04**	**2.70E-05**	**9.01E-05**
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	**1.99E-02**
	Benzo(a)pyrene			
	Analysis, *u*g/sample	*2.0*	*1.0*	**1.5**
	Molecular Weight, MW	252.3	252.3	**252.3**
	Concentration, lb/dscf	**7.36E-09**	**1.25E-09**	**0.0**
ppmdv	**Parts Per Million, Dry Basis**	**1.12E-02**	**1.91E-03**	**6.58E-03**
	Parts Per Million, Dry Basis	**1.14E-02**	**1.94E-03**	**6.67E-03**
	Emission Rate, lb/hr	**1.53E-04**	**2.70E-05**	**9.01E-05**
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	**1.99E-02**
	Indeno(1,2,3-c,d)pyrene			
	Analysis, *u*g/sample	*2.0*	*1.0*	**1.5**
	Molecular Weight, MW	276.3	276.3	**276.3**
	Concentration, lb/dscf	**7.36E-09**	**1.25E-09**	**0.0**
ppmdv	**Parts Per Million, Dry Basis**	**1.03E-02**	**1.74E-03**	**6.01E-03**
	Parts Per Million, Dry Basis	**1.04E-02**	**1.78E-03**	**6.10E-03**
	Emission Rate, lb/hr	**1.53E-04**	**2.70E-05**	**9.01E-05**
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	**1.99E-02**

Summary of Stack Gas Parameters and Test Results
030174.0003.002
Travis and Elmendorf AFB
PAH

	RUN NUMBER	***T-PAH-Comp***	***E-PAH-Comp***	
	RUN DATE	***06/11/02,06/12/02***	***6/25/02-6/27/02***	***Average***
	RUN TIME	***0856-1325,0753-1148***	***0732-1602, 1033-1058***	
	Dibenz(a,h)anthracene			
	Analysis, *u*g/sample	*2.0*	*1.0*	**1.5**
	Molecular Weight, MW	278.4	278.4	**278.4**
	Concentration, lb/dscf	**7.36E-09**	**1.25E-09**	**0.0**
ppmdv	**Parts Per Million, Dry Basis**	**1.02E-02**	**1.73E-03**	5.96E-03
	Parts Per Million, Dry Basis	**1.03E-02**	**1.76E-03**	**6.05E-03**
	Emission Rate, lb/hr	**1.53E-04**	**2.70E-05**	**9.01E-05**
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	**1.99E-02**
	Benzo(g,h,i,perylene)			
	Analysis, *u*g/sample	*2.0*	*1.0*	**1.5**
	Molecular Weight, MW	276.3	276.3	**276.3**
	Concentration, lb/dscf	**7.36E-09**	**1.25E-09**	**0.0**
ppmdv	**Parts Per Million, Dry Basis**	**1.03E-02**	**1.74E-03**	**6.01E-03**
	Parts Per Million, Dry Basis	**1.04E-02**	**1.78E-03**	**6.10E-03**
	Emission Rate, lb/hr	**1.53E-04**	**2.70E-05**	**9.01E-05**
	Emission Rate, lb/1000 lb fuel	3.47E-02	5.09E-03	**1.99E-02**

ALDEHYDE/KETONES
TRAVIS/ELMENDORF

Summary of Stack Gas Parameters and Test Results
030174.003.0002
Travis and Elmendorf AFB
Test Method 0011 - Aldehyde/Ketones

	RUN NUMBER / ***RUN DATE*** / ***RUN TIME***	***T-0011-Comp*** / ***6/11/02, 6/12/02*** / ***0815-1338,0750-1155***	***E-0011-Comp*** / ***6/25/02, 6/26/02*** / ***0732-1602, 1045-1110***	***Average***
	MEASURED DATA			
P_{static}	Stack Static Pressure, inches H_2O	-2.01	-1.84	-1.93
y	Meter Box Correction Factor	1.004	1.004	1.004
P_{bar}	Barometric Pressure, inches Hg	30.30	29.90	30.10
V_m	Sample Volume, ft^3	92.385	93.364	92.875
$Dp^{1/2}$	Average Square Root Dp, (in. $H_2O)^{1/2}$	1.4560	1 5371	1.4966
DH	Avg Meter Orifice Pressure, in. H_2O	1.90	1.98	1.94
T_m	Average Meter Temperature, °F	81	72	77
T_s	Average Stack Temperature, °F	594	621	608
V_{lc}	Condensate Collected, ml	99.0	111 9	105.5
CO_2	Carbon Dioxide content, % by volume	4 0	3.0	3.5
O_2	Oxygen content, % by volume	15.0	17 0	16.0
N_2	Nitrogen content, % by volume	81.0	80.0	80.5
C_p	Pitot Tube Coefficient	0.99	0.99	0.99
	Circular Stack? 1=Y,0=N:	1	1	
As	Diameter or Dimensions, inches:	4.00	4.00	4.00
F	Fuel Flow, lb/hr	4.41	4.90	
Q	Sample Run Duration, minutes	120	120	120
D_n	Nozzle Diameter, inches	0 190	0.191	0.191
	CALCULATED DATA			
A_n	Nozzle Area, ft^2	0.000197	0.000199	0.000198
$V_{m(std)}$	Standard Meter Volume, ft^3	92.060	93.386	92.723
$V_{m(std)}$	Standard Meter Volume, m^3	2.607	2.644	2.626
Q_m	Average Sampling Rate, dscfm	0.767	0 778	0.773
P_s	Stack Pressure, inches Hg	30.15	29.76	29.96
B_{ws}	Moisture, % by volume	4.8	5.3	5.1
$B_{ws(sat)}$	Moisture (at saturation), % by volume	10455 6	12886.9	11671.3
V_{wstd}	Standard Water Vapor Volume, ft^3	4.660	5 267	4.964
$1\text{-}B_{ws}$	Dry Mole Fraction	0.952	0.947	0.949
M_d	Molecular Weight (d.b.), lb/lb•mole	29.24	29.16	29.20
M_s	Molecular Weight (w.b.), lb/lb•mole	28.70	28.56	28.63
V_s	Stack Gas Velocity, ft/s	136 0	146.7	141.3
A	Stack Area, ft^2	0.1	0.1	0.09
Q_a	Stack Gas Volumetric flow, acfm	712	768	740
Q_s	Stack Gas Volumetric flow, dscfm	342	353	348
Q_s	Stack Gas Volumetric flow, dscmm	10	10	10
I	Isokinetic Sampling Ratio, %	99.4	96.7	98.1

Summary of Stack Gas Parameters and Test Results
030174.003.0002
Travis and Elmendorf AFB
Test Method 0011 - Aldehyde/Ketones

	RUN NUMBER RUN DATE RUN TIME	T-0011-Comp 6/11/02-6/12/02 0815-1338,0750-1155	E-0011-Comp 6/25/02, 6/26/02 0732-1602, 1045-1110	Average
	EMISSIONS DATA			
HCHO	Formaldehyde			
	Target Catch, µg	72	310	191.0
	Concentration, µg/dscm	27.62	117.23	72.42
	Emission Rate, lb/hr	3.53E-05	1.55E-04	9.50E-05
	Emission Rate, lb/1000 lb fuel	8.01E-03	3.16E-02	1.98E-02
CH_3CHO	Acetaldehyde			
	Target Catch, µg	51	110	80.5
	Concentration, µg/dscm	19.56	41.60	30.58
	Emission Rate, lb/hr	2.50E-05	5.49E-05	4.00E-05
	Emission Rate, lb/1000 lb fuel	5.67E-03	1.12E-02	8.44E-03
CH_2CHCHO	Acrolein			
	Target Catch, µg	100	240	170.00
	Concentration, µg/dscm	38.36	90.76	64.56
	Emission Rate, lb/hr	4 90E-05	1.20E-04	8.44E-05
	Emission Rate, lb/1000 lb fuel	1.11E-02	2.45E-02	1.78E-02
$CH_3CH_2CH_2OH$	Propanal			
	Target Catch, µg	24	52	38.0
	Concentration, µg/dscm	9.2	19.7	14.4
	Emission Rate, lb/hr	1.18E-05	2.60E-05	1.89E-05
	Emission Rate, lb/1000 lb fuel	2.67E-03	5.30E-03	3.98E-03
$CH_3CHCHCHO$	Crotonaldehyde			
	Target Catch, µg	68	150	109.00
	Concentration, µg/dscm	26.09	56.72	41.40
	Emission Rate, lb/hr	3.33E-05	7.49E-05	5.41E-05
	Emission Rate, lb/1000 lb fuel	7.56E-03	1.53E-02	1.14E-02
$CH_3COC_5H_{11}$	Methyl Ethyl Ketone/Butyraldehydes			
	Target Catch, µg	20	66	43.0
	Concentration, µg/dscm	7.7	25.0	16.3
	Emission Rate, lb/hr	9.81E-06	3.29E-05	2.14E-05
	Emission Rate, lb/1000 lb fuel	2.22E-03	6.73E-03	4.48E-03
C_6H_5CHO	Benzaldehyde			
	Target Catch, µg	110	250	180.0
	Concentration, µg/dscm	42.2	94.5	68.4
	Emission Rate, lb/hr	5.39E-05	1.25E-04	8.94E-05
	Emission Rate, lb/1000 lb fuel	1.22E-02	2.55E-02	1.89E-02
$CH_3)_2CHCH_2CHC$	Isopentanal			
	Target Catch, µg	9.6	13	11.3
	Concentration, µg/dscm	3.7	4.9	4.3
	Emission Rate, lb/hr	4 71E-06	6.49E-06	5 60E-06
	Emission Rate, lb/1000 lb fuel	1 07E-03	1.32E-03	1.20E-03

Summary of Stack Gas Parameters and Test Results
030174.003.0002
Travis and Elmendorf AFB
Test Method 0011 - Aldehyde/Ketones

	RUN NUMBER	***T-0011-Comp***	***E-0011-Comp***	
	RUN DATE	***6/11/02-6/12/02***	***6/25/02, 6/26/02***	***Average***
	RUN TIME	***0815-1338,0750-1155***	***0732-1602, 1045-1110***	
	EMISSIONS DATA - Continued			
$CH_3(CH_2)_3CHO$	Pentanal			
	Target Catch, µg	43	81	62.0
	Concentration, µg/dscm	16.5	30.6	23.6
	Emission Rate, lb/hr	2 11E-05	4 04E-05	3.08E-05
	Emission Rate, lb/1000 lb fuel	4.78E-03	8.26E-03	6.52E-03
$C_6H_4CH_3CHO$	o-Tolualdehyde			
	Target Catch, µg	9.4	67	38.2
	Concentration, µg/dscm	3.6	25.3	14.5
	Emission Rate, lb/hr	4.61E-06	3.34E-05	1.90E-05
	Emission Rate, lb/1000 lb fuel	1.05E-03	6.83E-03	3.94E-03
	m,p-Tolualdehyde			
	Target Catch, µg	66	290	178.000
	Concentration, µg/dscm	25.3	109.7	67.492
	Emission Rate, lb/hr	3.24E-05	1.45E-04	8.86E-05
	Emission Rate, lb/1000 lb fuel	7 34E-03	2.96E-02	1 84E-02
$CH_3(CH_2)_4CHO$	Hexanal			
	Target Catch, µg	19	67	43
	Concentration, µg/dscm	7.3	25.3	16.3
	Emission Rate, lb/hr	9.32E-06	3.34E-05	2.14E-05
	Emission Rate, lb/1000 lb fuel	2.11E-03	6 83E-03	4.47E-03

Run E-0011-Comp had a Rpt. Limit of 13.0; if ND result is shown in italics. Acetaldehyde and Hexanal were present in lab blank.
Run T-0011-Comp had a Rpt. Limit of 3.7; Acetaldehyde was present in lab blank; Acrolein may be biased due to matrix interference.

APPENDIX C

FIELD DATA

TRAVIS AFB

CLIENT ____ PN ____ Sheet No. 1

LOCATION ____ Checked BY ____ Date ____

SUBJECT ____ Computed By ____ Date ____

EQ

-86 EMISSION MEASUREMENT PROGRAM

TRAVIS AFB

HOLLINSWORTH MODELS

MAXIMUM AMPS 260 KVA 500 AMPS

VOLTS 115 ALWAYS

ENGINE ID # 4671000002 (CCTS TAG) -86 ID # DG87

~7.4 lbs/gal

~7.17 lbs/gal. Sp. gr. = 0.86

TIME (24 hr.)	DATE	LOAD (%)	FUEL WT (lbs.)	FUEL TEMP (°F)	AMPS KVA	
0810	6/11/02	10	43.25	82	~~23~~ 25 AMPS	KW / 0.08 = ACTUAL GAS
0845	6/11/02	10	29.85	150	25 ~35 KVA	
0900	6/11/02	10	25.80	159	25	ΔFUEL → 28.45 lbs / 80 minutes
0930	6/11/02	10	~~19~~ 14.80	167	25	21.36 lbs/hr. AVE.
	REFUEL					2.9 gal/hr.
0950	6/11/02	10	39.20	112	25	2.98 (1)
1005	6/11/02	10	33.85	120	25	
1025	6/11/02	10	26.75	134	25	
1052	6/11/02	10	~~18.5~~ MALFUNCTION	136	25	
1105	6/11/02	10	14.0	138	25	ΔFUEL → 25.2 lbs / 75 minutes
	REFUEL			122	25	20.16 lbs/hr AVE.
1110	6/11/02	10	40.55			
1136	6/11/02	10	33.05	149	25	~~2.72~~ gal/hr. 2.81 (2)
1205	6/11/02	10	22.60	151	25	
1230	6/11/02	10	13.20	142	25	ΔFUEL 27.35 lbs / 80 minutes
	REFUEL					
24 1235	6/11/02	25	44.50	122	77 KVA	20.51 lbs/hr. AVE.
1310	6/11/02	25	28.75	160	77 KVA	~~2.77~~ gal/hr. 2.86 (3)
1345	6/11/02	25	15.55	166	77	ΔFUEL 28.95 lbs. 1.16 hr. / 70 minutes
	REFUEL					24.81 lbs/hr.
1350	6/11/02	25	45.65	123	77	~~3.35~~ gal/hr 3.46 (1)
1420	6/11/02	25	30.85	161	77	ΔFUEL 27.3 lbs
1435	6/11/02	25	25.55	165	77	60 min.
1450	6/11/02	25	18.35	168	77	27.3 lbs/hr.
	REFUEL					~~3.69~~ gal/hr. 3.81 (2)
1455	6/11/02	25	44.30	122	77	

CLIENT		EQ	PN	Sheet No. 2/
LOCATION			Checked BY	Date
SUBJECT			Computed By	Date

	TIME	DATE	LOAD (%)	FUEL WT. (lbs.)	FUEL TEMP (°F)	AMPS · KVA	
	1525	6/11/02	25	30.35	160	77	ΔFUEL: 26.85 lbs.
	1540	6/11/02	25	26.30	163	77	60 min.
	1565	6/11/02	25	11.45	168	77	26.85 lbs/hr.
	1600	6/11/02 REFUEL	25	41.15	126	77	~~3.63~~ gal/hr. 3.75
	1620	6/11/02	25	31.95	158	77	(3)
50%	0710	6/12/02	50	41.55	85	130 KVA	ΔFUEL = 22.95 lbs 40 min.
	0755	6/12/02	50	27.9	132	130 KVA	34.42 lbs/hr.
	0810 REFUEL	6/12/02	50	18.60	106	130 KVA	~~4.7~~ gal/hr. 4.8
	0815	6/12/02	50	45.40	107	130 KVA	(1)
	0830	6/12/02	50	35.85	131	130 KVA	ΔFUEL = 31.35 lbs. 50 min.
	0850	6/12/02	50	23.25	108	130 KVA	37.62 lbs/hr.
	0905 REFUEL	6/12/02	50	14.05	105	130 KVA	~~5.08~~ gal/hr. 5.25 (2)
	0910	6/12/02	50	45.95	96	130 KVA	ΔFUEL = 31.8 lbs
	0925	6/12/02	50	36.40	130	130	50 min.
	1000 REFUEL	6/12/02	50	14.15	151	130	38.16 lbs/hr. ~~5.16 lbs/hr.~~ gal 5.32
	1005	6/12/02	50	45.10	103	130	ΔFUEL = 32.25 lbs
	1040	6/12/02	50	25.80	~~145~~ 151	130	55 min.
	1100 REFUEL	6/12/02	50	12.85	157	130	35.18 lbs/hr. ~~4.75~~ gal/hr. 4.91 (3)
75%	1120	6/12/02	75	34.08	140	190 KVA	ΔFUEL = 19.1 lbs
	1135	6/12/02	75	24.15	154	190 KVA	30 min.
	1150 REFUEL	6/12/02	75	14.90	162	190	38.2 lbs/hr. ~~5.2~~ gal/hr. 5.33 (1)
	1150	6/12/02	75	46.05	102	190	ΔFUEL = 28.55 lbs
	1220	6/12/02	75	27.20	152	190	40 mins.
	1230	6/12/02 REFUEL	75	17.50	161	190	42.82 lbs/hr. ~~5.79~~ gal/hr. 5.97
	1235	6/12/02	75	46.15	109	190	(2)
	1300	6/12/02	75	28.00	152	190	ΔFUEL = 32 lbs.
	1315	6/12/02 REFUEL	75	14.15	165	190	40 mins. 47.99 lbs/hr. ~~6.49~~ gal/hr. 6.69

CLIENT ______ LOCATION ______ SUBJECT ______

EQ

PN ______ Sheet No. 3

Checked BY ______ Date ______

Computed By ______ Date ______

TIME (24h)	DATE	LOAD (%)	FUEL WT. (lbs)	FUEL TEMP (F)	AMPS KVA	
1320	6/12/02	75	45.35	105	190	ΔFuel = 30.14 ~~29.09~~ lbs.
1345	6/12/02	75	27.90	154	190	45min.
1400	6/12/02	75	15.21	169	190	40.19 ~~38.79~~ lbs/hr.
						5.60 ~~5.24~~ lbs/h. (3)
Refuel						
1405	6/12/02	75	46.65	108	190	ΔFuel = 31.35 lbs.
1425	6/12/02	75	31.15	151	190	40 minutes
1445	6/12/02	75	15.30	169	190	47.02 lbs/hr. Avg. 5.85 gal/hr
Refuel						~~6.36~~ lbs/hr.
1450	6/12/02	75	44.5	110	190	6.55
100% CBM ONLY 100%						
1500	6/12/02	100	36.70	140	266	ΔFuel: 11.45 lbs.
1510	6/12/02	100	25.25	145	266	10min.
						68.69 lbs/hr.
100% 0725	6/13/02	100	42.50	68	266	9.28 GAL/hr.
0745	6/13/02	100	26.96	122	266	ΔFuel: 27.7 lbs.
0800	6/13/02	100	14.80	152	266	35min.
						47.49 lbs/hr.
Refuel						
0800	6/13/02	100	46.25	96	266	6.62 ~~6.42~~ gal/hr.
0820	6/13/02	100	25.10	148	266	ΔFuel = 33.1 lbs. (1)
0835	6/13/02	100	13.15	163	266	35min.
						56.74 lbs/hr. Avg. 7 gal/hr.
Refuel						
0840	6/13/02	100	45.20	94	266	7.91 ~~7.9~~ gal/hr.
0855	6/13/02	100	30.65	142	266	ΔFuel = 34.11 lbs.
0915	6/13/02	100	11.09	155	266	35min.
						58.48 lbs/hr.
Refuel						
0915	6/13/02	100	45.40	97	266	8.16 ~~7.9~~ gal/hr.
0940	6/13/02	100	21.20	162	266	ΔFuel: 33.05 lbs. (2)
0950	6/13/02	100	12.35	164	266	35min.
						56.66 lbs/hr.
Refuel						
0955	6/13/02	100	46.20	95	266	7.90 ~~7.66~~ gal/hr.
1010	6/13/02	100	31.20	148	266	ΔFuel: 33.95 lbs
1030	6/13/02	100	12.25	158	266	35min.
						58.20 lbs/hr
						8.12 ~~7.86~~ gal/hr. (3)

CLIENT

LOCATION

SUBJECT

EQ

PN

Checked BY Date

Computed By Date

Sheet No. 41

TIME	DATE	% LOAD	WEIGHT	TEMP
1030	6/13/02 ~~100~~	100	46.30	97
1050	6/13/02	100	28.65	153
1055	6/13/02	100	22.05	158

Δ Fuel = 24.25 lbs.
25 min.
58.2 lbs/hr. — (3)
8.12 ~~7.86~~ GAL/hr.

Environmental Quality Management, Inc.

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Travis AFB Date: 6/10/02
Sampling Location: Generator Outlet Clock Time: 1430
Run #: 75% 1 Operators: RK / TC
Barometric Pressure, in.Hg: 30.30 Static Pressure, in.H_2O: ______
Moisture, %: 4 Molecular wt., Dry: ______ Pitot Tube, Cp: 0.99
Stack Dimension, in. Diameter or Side 1: 3" Side 2: ______
Wet Bulb, °F: ______ Dry Bulb, °F: ______
Pitot # ______ Thermocouple # ______

ΔP= 8.9
√ΔP = 2.98
Ts = 745.2
Md= 29.16
Ms = 28.71
Ps= 30.18
Vs = 297.6
75%
acfm = 876
dscfm = 371.9

100%
√ΔP = 3.16
Ts = 820 °F
Vs = 325
acfm = 956
dscfm = 381

Traverse Point Number	Velocity Head in.H_2O	Stack Temp, °F
1	9.6	740
2	9.3	740
3	8.5	738
1	8.2	744
2	8.8	753
3	9.0	756
1	9.8	810
2	10.1	814
3	9.6	818
1	11.0	826
2	8.9	829
3	10.5	826
	$\overline{\sqrt{\Delta P}}$=	$\overline{Ts}$=

$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times \%N_2)$

$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$

Static = -1.6"

Md =

$Ms = Md \times \left(1 - \frac{\%H_2O}{100}\right) + 18\left(\frac{\%H_2O}{100}\right)$

$Ms = (\quad) \times \left(1 - \frac{}{100}\right) + 18\left(\frac{}{100}\right)$

Ms =

$\overline{Ts}$ = °F = °R (°F + 460)

$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{}{13.6}$

Ps = in. Hg

Static = -2.0"

$\overline{\sqrt{\Delta P}}$ =

$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$

$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$

Vs = ft^2

As = ft^2

Qs = Vs × As × 60s/m

Qs = × ×60

Qs = acfm

Qs = dscfm

$4'' = 0.0873\ ft^2$
$3'' = 0.049\ ft^2$ $0.049\ ft^2$

Environmental Quality Management, Inc.

10, 25, 50, 75, 100

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Travis AFB   Date: 6/10/02
Sampling Location: Generator Outlet   Clock Time: 1430
Run #: 10%   Operators: AK/TG
Barometric Pressure, in.Hg: ______   Static Pressure, in.H_2O: 20% = -2.0"
Moisture, %: 4   Molecular wt., Dry: ______   Pitot Tube, Cp: 10% = -1.2" 0.99
Stack Dimension, in. Diameter or Side 1: 3"   Side 2: ______
Wet Bulb, °F: ______   Dry Bulb, °F: ______
Pitot # ______   Thermocouple # ______

Traverse Point Number	Velocity Head in.H_2O	Stack Temp, °F
1	6.4	565
2	6.5	567
3	6.2	569
1	5.5	560
2	6.0	565
3	6.2	569
1	5.5	500
2	5.5	500
3	5.6	500
1	5.2	494
2	5.3	492
3	5.4	494
1	6.9	636
2	6.6	615
3	6.0	633
1	6.4	632
2	6.9	642
3	7.3	647
	$\sqrt{\Delta P}$ =	$\overline{Ts}$ =

20%
$\sqrt{\Delta P} = 2.476$
$\Delta P = 6.13$
$Ts = 565$

$\Delta P = 2.33$
$\Delta P = 5.42$
10%
$Ts = 498$

50%
$\Delta P = 6.68$
$\sqrt{\Delta P} = 2.583$
$Ts = 634$

Static = -2.0"
Md = 29.16
Ms = 28.71
Ps = 30.15
Vs = 245.8
acfm = 724.09
dscfm = 338.0

$$Md = (0.44 \times \%\ CO_2) + (0.32 \times \%\ O_2) + (0.28 \times \%\ N_2)$$

$$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$$

Md =

$$Ms = Md \times \left(1 - \frac{\%\ H_20}{100}\right) + 18\left(\frac{\%\ H_20}{100}\right)$$

$$Ms = (\quad) \times \left(1 - \frac{\quad}{100}\right) + 18\left(\frac{\quad}{100}\right)$$

Ms =

$\overline{Ts}$ = °F = °R(°F + 460)

$$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{\quad}{13.6}$$

Ps = in. Hg

$\overline{\sqrt{\Delta P}}$ =

$$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$$

$$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$$

Vs = ft^2

As = ft^2

Qs = Vs x As x 60s/m

Qs = × ×60

Qs = acfm

Qs = dscfm

2
Vs = ~~215.6~~ 229.2
acfm = 675

$CO_2 = 3$
$O_2 = 17$

1
Vs = 208.3
acfm = 612.4

N:\Forms\Forms\Emission Testing\Gas Velocity and Volumetric Flow Rate.doc

Environmental Quality Management, Inc.

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Travis AFB Date: 6/11/02
Sampling Location: Generator Outlet Clock Time: 1004
Run #: Flow at 10% Operators: [illegible]/TG
Barometric Pressure, in.Hg: 30.30 Static Pressure, in.H_2O: −0.30
Moisture, %: 4 Molecular wt., Dry: ______ Pitot Tube, Cp: 0.99
Stack Dimension, in. Diameter or Side 1: 3.0" Side 2: ______
Wet Bulb, °F: ______ Dry Bulb, °F: ______
Pitot # ______ Thermocouple # ______

Traverse Point Number	Velocity Head in.H_2O	Stack Temp, °F
1	4.2	445
2	4.3	449
3	4.5	453
1	4.8	454
2	4.8	459
3	4.7	462
1	3.8	482
2	4.0	482
3	4.2	481
1	4.9	483
2	4.6	485
3	4.7	486
	$\overline{\sqrt{\Delta P}}$=	$\overline{Ts}$=

$\Delta P = 4.55$
$\sqrt{\Delta P} = 2.132$
$Ts = 454$
$Md = 29.16$
$Ms = 28.71$
$Ps = 30.28$
$Vs = 185.01$
544 acfm
305 dscfm

@ 1130

$\Delta P = 4.37$
$\sqrt{\Delta P} = 2.088$
$Ts = 483$
$Md = 29.16$
$Ms = 28.71$
$Ps = 30.43$
$Vs = 183.55$
acfm = 540.6
dscfm =

$Md = (0.44 \times \%\, CO_2) + (0.32 \times \%\, O_2) + (0.28 \times \%\, N_2)$

$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$

Md =

10% Load

$Ms = Md \times \left(1 - \frac{\%\, H_2O}{100}\right) + 18\left(\frac{\%\, H_2O}{100}\right)$

$Ms = (\quad) \times \left(1 - \frac{\quad}{100}\right) + 18\left(\frac{\quad}{100}\right)$

Ms =

$\overline{Ts}$ = °F = °R(°F + 460)

$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{\quad}{13.6}$

Ps = in. Hg

Static = +1.8

$\overline{\sqrt{\Delta P}}$ =

$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$

$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$

Vs = ft^2

As = ft^2

Qs = Vs × As × 60 s/m

Qs = × × 60

Qs = acfm

Qs = dscfm

FIELD DATA SHEET K = 2.42

Plant: Travis AFB Sample Type: M5/202 Operator: TG.
Sampling Location: -86 Exhaust Pbar: 30.30 Ps: -1.2"
Run Number: MS-10-1 Date: 6/11/02 CO_2: 3% O_2: 17%
Pretest Leak Rate: 0.004cfm @ 15 in.Hg. Probe Length/Type: 2' Glass Pitot#: N/A
Pretest Leak Check: Pitot: ✓ Orsat: N/A Stack Diameter: 4" As:

Nozzle ID: 0.205 Thermocouple #: 5115
Assumed Bws: 4 Filter #: 830244
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: 0.004cfm @ 7 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: N/A

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	0815	382.386										
	5	0820	—	1.73	2.34	2.34	498	254	251	62	75	74	1
	10	0825	391.1	1.73	2.44	2.44	465	254	253	49	80	78	1
	15	0830	394.9	1.73	2.44	2.44	465	252	250	50	85	80	1
	20	0835	399.22	1.73	2.47	2.50	464	254	252	52	87	81	1
	25	0840	403.84	1.73	2.47	2.47	468	253	254	53	90	82	1
	30	0845	407.52	1.73	2.47	2.47	471	253	252	54	93	84	1
	35	0850	412.4	1.73	2.47	2.47	472	254	252	54	94	85	1
	40	0855	416.91	1.73	2.47	2.47	472	253	252	54	94	85	1
	45	0900	421.12	1.73	2.49	2.49	471	254	252	56	97	88	1
	50	0905	426.02	1.73	2.48	2.48	474	250	252	56	98	89	6
	55	0910	429.30	1.73	2.54	2.54	454	252	254	57	99	90	6
	60	0915	433.054	1.73	2.49	2.49	472	255	253	58	100	91	7

ACFM = 603.5
DSCFM = 332.3
ESO = 95%

ΔVm = 50.668 ✓ $\overline{\sqrt{\Delta p}}$ = 1.3153 ✓ $\overline{\Delta H}$ = 2.47 ✓ $\overline{Ts}$ = 471 ✓ $\overline{Tm}$ = 87 ✓

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB Run No. T-5 @0-1

Date 6/11/02 Sample Box No. SB-5 Job No. 30174.0007.002

Sample Location Generator 1 - 10% Filter No. 830244

Train Preparer RK / AG

Sample Recovery Person DA

Comments Method 5 train / 202 backhalf

Front Half

Acetone Container No. ________ Liquid Level Marked ______ Sealed ________

Filter Container No. ________________ Sealed ________________

Description of Filter Black - Covered

Samples Stored and Locked ________________

Back Half/Moisture

Container No. ________________

Liquid Level Marked ________________ Sealed ________________

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H2O	100	722.0	731.1	9.1
2	DI H2O	100	732.8	751.0	18.2
3	Empty	—	626.3	630.4	4.1
4	Silica Gel	250+	812.0	823.7	11.7
5					
6					
Total					43.1

Description of Impinger Catch: Cloudy / Milky

FIELD DATA SHEET

Plant: Travis AFB
Sample Type: M5/202
Operator: TG
Sampling Location: -860 Exhaust
Pbar: 30.30
Ps: -1.2"
Run Number: M5-10-2
Date: 6/11/02
CO_2: 3%
O_2: 17%
Pretest Leak Rate: .002 cfm @ 10 in.Hg.
Probe Length/Type: 2' Glass
Pitot#: N/A
Pretest Leak Check: Pitot: ____ Orsat: ____
Stack Diameter: 4"
As: ____

Nozzle ID 0.205
Thermocouple #: SM-5
Assumed Bws: 4
Filter #: R011
Meter Box #: 7
Y: 1.001
ΔH@: 1.775
Post-Test Leak Rate: .003 cfm @ 15 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	0950	433.373										
	5	0955	434.92	1.73	2.27	2.30	566	254	251	63	96	95	5
	10	1000	437.89	1.73	2.53	2.5	462	253	254	60	97	97	5
	15	1005	442.36	1.73	2.58	2.6	446	253	254	61	100	98	7
	20	1010	447.11	1.73	2.59	2.6	447	252	256	64	103	98	8
	25	1015	451.11	1.73	2.53	2.5	468	257	256	65	104	99	9
	30	1020	455.58	1.73	2.52	2.5	473	253	251	67	105	99	9
	35	1025	459.98	1.73	2.52	2.5	473	253	252	69	104	99	10
	40	1030	464.47	1.73	2.51	2.6	475	253	254	70	104	99	11
	45	1035	468.60	1.73	2.50	2.5	477	254	258	70	103	98	12
	50	1040	472.95	1.73	2.49	2.5	481	254	262	70	102	98	12
	55	1045	476.44	1.73	2.49	2.5	480	253	252	71	102	98	13
	60	1050	485.428	1.73	2.49	2.5	479	253	254	69	101	97	14

acfm
605.1
dscfm
3322
Iso
96

$\Delta Vm = 52.055$ $\sqrt{\Delta p} = 1.3153$ $\overline{\Delta H} = 2.50$ $\overline{Ts} = 477$ $\overline{Tm} = 100$

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB Run No. T-5-10-2
Date 6/11/02 Sample Box No. SB-1 Job No. 30174.003.002
Sample Location Generator exhaust -10% Filter No. PC011
Train Preparer Dk/AG
Sample Recovery Person D.A.
Comments 5/202

Front Half
Acetone Container No. ______ Liquid Level Marked ______ Sealed ______

Filter
Container No. ______ Sealed ______

Description of Filter Black

Samples Stored and Locked ______

Back Half/Moisture
Container No. ______

Liquid Level Marked ______ Sealed ______

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	~~DI~~ H20	100	724.2	731.5	7.3
2	DI H20	100	726.7	737.7	11.0
3	Empty	—	619.5	623.9	4.4
4	Silica Gel	250	816.6	832.3	15.7
5					
6					
Total					38.4 ✓

Description of Impinger Catch: Cloudy

FIELD DATA SHEET

10% Load

Plant: Travis AFB
Sampling Location: - 56 DE xhaust
Run Number: MS-10-3 Date: 6/11/02
Pretest Leak Rate: .004 cfm @ 10 in.Hg.
Pretest Leak Check: Pitot: ____ Orsat: ____

Sample Type: MS/202 Operator: AG
Pbar: 30.30 Ps: -1.7"
CO_2: 3% O_2: 17%
Probe Length/Type: 2' Glass Pitot#: N/A
Stack Diameter: 4" As: ____

Nozzle ID: 0.205 3.8 Thermocouple #: SH-5
Assumed Bws: 4 Filter #: 830246
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: 0.012 cfm @ 12 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
0	0	11:20	485.896										
1	5	1125	490.75	1.73	2.45	2.5	488	252	254	61	94	94	2
2	10	1130	494.91	1.73	2.45	2.5	486	252	255	58	94	94	3
3	15	1135	499.21	1.73	2.46	2.5	486	253	256	58	97	94	4
4	20	1140	503.62	1.73	2.46	2.5	486	253	252	59	99	94	5
5	25	1145	508.22	1.73	2.46	2.5	486	253	255	61	100	94	5
6	30	1150	512.61	1.73	2.46	2.5	489	253	254	61	101	94	6
7	35	1155	516.5	1.73	2.45	2.5	491	254	255	62	101	94	7
8	40	1200	520.8	1.73	2.5	2.5	491	252	251	62	102	94	8
9	45	1205	525.5	1.73	2.5	2.5	493	252	252	63	102	95	9
10	50	1210		1.73	2.5	2.5	490	251	253	65	102	95	10
11	55	1215	533.9	1.73	2.5	2.5	495	254	254	65	102	95	11
12	60	1220	538.241	1.73	2.5	2.5	493	252	252	65	102	95	12

Acfm 609.2

Dscfm 329.2

Pso 98

ΔVm = 52.345 $\sqrt{\Delta p}$ = 1.3153 $\overline{\Delta H}$ = 2.50 $\overline{Ts}$ = 490 $\overline{Tm}$ = 97

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB Run No. T-M5-10-3
Date 6/11/02 Sample Box No. SB-3 Job No. 30179-0003-002
Sample Location Generator Outlet Filter No. 830246
Train Preparer [illegible] / A Greber
Sample Recovery Person DA
Comments

Front Half
Acetone Container No. ______ Liquid Level Marked ______ Sealed ______

Filter
Container No. ______ Sealed ______

Description of Filter Black

Samples Stored and Locked ______

Back Half/Moisture
Container No. ______

Liquid Level Marked ______ Sealed ______

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	DI H2O	100	712.9	723.6	10.7
2	DI H2O	100	713.2	725.5	12.3
3	Empty	—	618.5	622.7	4.2
4	Silica gel	250	828.9	843.7	14.8
5					
6					
Total					42.0

Description of Impinger Catch: Cloudy

1.0060

122.5

91.81

Environmental Quality Management, Inc.

25% Load

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Travis AFB Date: 6/11/02
Sampling Location: Generator Outlet Clock Time: 1255
Run #: 25% load Operators: RK/TG
Barometric Pressure, in.Hg: 30.3 Static Pressure, in.H_2O: -2.5"
Moisture, %: ______ Molecular wt., Dry: ______ Pitot Tube, Cp: 0.99
Stack Dimension, in. Diameter or Side 1: 3" Side 2: ______
Wet Bulb, °F: ______ Dry Bulb, °F: ______
Pitot # ______ Thermocouple # ______

Md=29.16
Ms=28.71
Ps=30.12
Vs=217.80
ΔP=5.62
√ΔP=2.370
Ts=560
acfm=641.5
dscfm=321.0

@ 1255

Md=29.16
Ms=28.71
Ps=30.15

1410
vs=216.9
acfm=639.0
dscfm=320.3

avg ΔP=5.583
√ΔP=2.363
Ts=559.2

@ 1618

Traverse Point Number	Velocity Head in.H_2O	Stack Temp,°F
1	5.7	559
2	5.7	560
3	5.6	559
1	5.6	560
2	5.5	560
3	5.6	560
1	5.5	560
2	5.8	560
3	5.6	560
1	5.5	559
2	5.6	558
3	5.5	558
1	5.6	559
2	5.5	559
3	5.2	558
1	5.4	558
2	5.3	559
3	5.1	560
	$\sqrt{\Delta P}$ =	$\overline{Ts}$ =

$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 \times \% N_2)$

$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$

$Md =$

$Ms = Md \times \left(1 - \frac{\% H_2O}{100}\right) + 18\left(\frac{\% H_2O}{100}\right)$

$Ms = (\quad) \times \left(1 - \frac{}{100}\right) + 18\left(\frac{}{100}\right)$

$Ms =$

$Ts = \quad °F = \quad °R(°F + 460)$

$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{}{13.6}$ -2.0"

Static = ~~-2.0~~

$Ps = \quad$ in. Hg

$\sqrt{\Delta P} =$

$Vs = 85.49 \times Cp \times \sqrt{\Delta P} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$

$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$

$Vs = \quad ft^2$

$As = \quad ft^2$ Static = -3.0"

$Qs = Vs \times As \times 60 s/m$

$Qs = \quad \times \quad \times 60$

$Qs = \quad$ acfm

$Qs = \quad$ dscfm

FIELD DATA SHEET

25% Load

Plant: Travis AFB
Sampling Location: Generator Outlet
Run Number: T-M5-25-1 Date: 6/11/02
Pretest Leak Rate: 0.003 cfm @ 11 in.Hg.
Pretest Leak Check: Pitot: _____ Orsat: _____

Sample Type: M5/202 Operator: AK/AG
Pbar: 30.30 Ps: -2
CO_2: 3.6 O_2: 15.9
Probe Length/Type: 2' Glass Pitot#: _____
Stack Diameter: 4" As: _____

Nozzle ID: 0.205 Thermocouple #: _____ 4.4
Assumed Bws: 4 Filter #: 830245
Meter Box #: MB-7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: .006 cfm @ 13 in.Hg.
Post-Test Leak Check: Pitot: _____ Orsat: _____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
0	0	12:55	538.804										
1	5	13:00	543.91	2.0	2.82	2.80	491	254	252	58	94	94	2
2	10	13:05	548.67	2.0	2.66	2.7	549	253	252	58	95	94	4
3	15	1310	552.62	2.0	2.64	2.6	559	252	264	58	98	94	5
4	20	1315	557.58	2.0	2.65	2.7	558	255	254	61	100	94	6
5	25	1320	562.05	2.0	2.65	2.7	568	253	255	63	102	95	7
6	30	1325	567.06	2.0	2.66	2.7	556	253	252	65	103	95	8
7	35	1330	571.00	2.0	2.66	2.7	557	255	253	66	104	96	9
8	40	1335	575.95	2.0	2.66	2.7	560	253	256	66	104	96	9
9	45	1340	580.00	2.0	2.66	2.7	559	254	254	68	105	96	10
10	50	1345	584.32	2.0	2.66	2.7	562	254	253	64	105	97	11
11	55	1350	589.09	2.0	2.65	2.7	564	253	252	60	105	97	12
12	60	1355	592.891	2.0	2.67	2.7	559	252	253	59	105	98	13

Acfm 677.7

Dscfm 340.6

Iso 97

ΔVm = 54.087 $\sqrt{\Delta p}$ = 1.4142 $\overline{\Delta H}$ = 2.7 $\overline{Ts}$ = 553 $\overline{Tm}$ = 99

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB Run No. T-5-T5-1
Date 6/11/02 Sample Box No. SB-2 Job No. 30174.0003.002
Sample Location Generator outlet 25% Filter No. 830245
Train Preparer RL/AG
Sample Recovery Person DA
Comments Method 5/202 train

Front Half

Acetone Container No. ________ Liquid Level Marked ______ Sealed ________

Filter Container No. ________ Sealed ________

Description of Filter Black

Samples Stored and Locked ________

Back Half/Moisture

Container No. ________

Liquid Level Marked ________ Sealed ________

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H_2O	100	710.4	724.0	13.6
2	DI H_2O	100	730.2	746.5	16.3
3	Empty	—	630.2	635.3	5.1
4	Silica Gel	250	879.8	895.3	15.5
5					
6					
Total					50.5

Description of Impinger Catch: Cloudy

FIELD DATA SHEET

3-9

Plant: Travis AFB
Sampling Location: Generator Outlet
Run Number: T-M5-2S-2 Date: 6/11/02
Pretest Leak Rate: .002 cfm @ 11 in.Hg.
Pretest Leak Check: Pitot: ____ Orsat: ____

Sample Type: M5/202 Operator: ____
Pbar: 30.30 Ps: -2
CO_2: 3.7 O_2: 15.9
Probe Length/Type: 2' Glass Pitot#: ____
Stack Diameter: 4" As: ____

Nozzle ID: .205 Thermocouple #: ____
Assumed Bws: 4% Filter #: PC018
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: .005 cfm @ 17 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1410	593.095										
	5	1415	597.96	2.0	2.42	2.4	560	253	258	71	98	98	5
	10	1420	602.16	2.0	2.66	2.7	559	252	255	69	101	98	5
	15	1425	606.49	2.0	2.66	2.7	559	252	254	59	103	98	7
	20	1430	611.02	2.0	2.67	2.7	559	255	257	57	105	98	8
	25	1435	615.01	2.0	2.67	2.7	557	251	247	56	106	98	9
	30	1440	619.62	2.0	2.68	2.7	556	252	250	56	106	99	10
	35	1445	624.45	2.0	2.68	2.7	558	254	253	57	107	99	11
	40	1450	629.10	2.0	2.68	2.7	558	253	253	58	107	99	13
	45	1455	633.44	2.0	2.68	2.7	558	254	254	59	107	100	14
	50	1500	638.00	2.0	2.68	2.7	557	255	252	60	107	100	14
	55	1505	642.65	2.0	2.69	2.7	553	252	251	61	106	100	15
	60	1510	646.717	2.0	2.69	2.7	554	254	253	62	106	100	17

acfm = 678.4

dscfm = 341.1

Iso 95.7

ΔVm = 53.622 $\sqrt{\Delta p}$ = 1.4142 $\overline{\Delta H}$ = 2.68 $\overline{Ts}$ = 557 $\overline{Tm}$ = 102

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB
Run No. T-5-25-2
Date 6/11/02 Sample Box No. SB-1
Job No. 30174.0003.002
Sample Location Generator #1 -
Filter No. PC 018
Train Preparer DA
Sample Recovery Person DA
Comments

Front Half
Acetone Container No. ______ Liquid Level Marked ______ Sealed ______

Filter
Container No. ______ Sealed ______

Description of Filter Black

Samples Stored and Locked ______

Back Half/Moisture
Container No. ______

Liquid Level Marked ______ Sealed ______

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H2O	100	728.8	768.9	40.1
2	"	"	728.1	715.0	-13.1
3	—	→	624.7	625.9	1.2
4	SG	250	832.3	848.0	15.7
5					
6					43.9
Total					[illegible]

Description of Impinger Catch: Cloudy

FIELD DATA SHEET

4.1

Plant: Travis AFB
Sampling Location: Generator Outlet
Run Number: T-M5-25-3 Date: 6/11/02
Pretest Leak Rate: .003 cfm @ 11 in.Hg.
Pretest Leak Check: Pitot: ____ Orsat: ____

Sample Type: M5/202 Operator: AWB
Pbar: 30.30 Ps: ~2
CO_2: 3.9 O_2: 15.5
Probe Length/Type: 2' Glass Pitot#: ____
Stack Diameter: 4" As: ____

Nozzle ID: .205 Thermocouple #: ____
Assumed Bws: 4 Filter #: ____
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: .002 cfm @ 10 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head.	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1530	647.058										
	5	1535	652.48	2.0	2.68	2.7	551	241	257	76	100	99	3
	10	1540	656.55	2.0	2.67	2.7	556	253	258	65	103	100	4
	15	1546	661.28	2.0	2.68	2.7	556	254	251	58	106	100	5
	20	1550	665.52	2.0	2.68	2.7	557	255	256	55	108	100	5
	25	1555	670.14	2.0	2.69	2.7	559	253	251	55	110	101	6
	30	1600	675.05	2.0	2.68	2.7	560	254	252	54	110	101	7
	35	1605	679.78	2.0	2.68	2.7	560	254	253	55	110	101	8
	40	1610	684.37	2.0	2.69	2.7	557	256	254	56	110	102	8
	45	1615	688.69	2.0	2.69	2.7	558	254	251	57	110	102	9
	50	1620	693.41	2.0	2.69	2.7	559	254	253	58	110	102	9
	55	1625	698.45	2.0	2.69	2.7	557	253	255	59	110	102	10
	60	1630	702.311	2.0	2.70	2.7	555	253	253	60	110	103	11

acfm 678.4

dscfm 340.5

Iso 98

ΔVm = 55.253 ✓ $\overline{\sqrt{\Delta p}}$ = 1.4142 ✓ $\overline{\Delta H}$ = 2.70 ✓ $\overline{Ts}$ = 557 ✓ $\overline{Tm}$ = 105 ✓

EQ Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB Run No. T-5-25-3

Date 6/11/02 Sample Box No. SB-5 Job No. 30174.0003.002

Sample Location Generator #1 - 25% Filter No. 930303

Train Preparer D.A.

Sample Recovery Person DA

Comments

Front Half

Acetone Container No. Liquid Level Marked Sealed

Filter Container No. Sealed

Description of Filter Black

Samples Stored and Locked

Back Half/Moisture

Container No.

Liquid Level Marked Sealed

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	DI H_2O	100	724.5	783.6	59.1
2	"	"	735.3	707.2	-28.1
3	—	—	630.8	633.5	2.7
4	S. G.	250	823.7	837.4	13.7
5					
6					
Total					47.4

Description of Impinger Catch: Cloudy

Environmental Quality Management, Inc.

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Travis AFB Date: 6/12/02
Sampling Location: Generator Outlet Clock Time: 0825
Run #: 50% Load Operators: RK/TG
Barometric Pressure, in.Hg: 30.30 Static Pressure, in.H_2O:
Moisture, %: 4 Molecular wt., Dry: ____ Pitot Tube, Cp: 0.99
Stack Dimension, in. Diameter or Side 1: 3" Side 2: —
Wet Bulb, °F: ____ Dry Bulb, °F: ____
Pitot # ____ Thermocouple # ____

$\sqrt{\Delta P}$ = 2.60
Ts = 622 °R
Md = 29.24
Ms = 28.79
Ps = 30.15

@ 0825

Traverse Point Number	Velocity Head in.H_2O	Stack Temp, °F
1	6.3	620
2	6.6	622
3	6.9	624
1	6.9	621
2	~~7~~7.0	624
3	6.9	623
1	6.9	627
2	6.9	629
3	6.6	630
1	6.7	633
2	6.8	634
3	6.8	635
1	~~7.5~~ 6.6	633
2	6.7	628
3	6.5	624
1	6.9	634
2	7.1	634
3	7.1	633
	$\overline{\sqrt{\Delta P}}$ =	$\overline{Ts}$ =

Vs = 245.8
acfm = 723.9
dscfm = 341.7

@ 0945

@ 1055

$$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 \times \% N_2)$$

$$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$$

Md =

static = -2.2"

$$Ms = Md \times \left(1 - \frac{\% H_2O}{100}\right) + 18\left(\frac{\% H_2O}{100}\right)$$

$$Ms = (\quad) \times \left(1 - \frac{}{100}\right) + 18\left(\frac{}{100}\right)$$

Ms =

$\sqrt{\Delta P}$ = 2.604
Ts = 631 F
Md = 29.24
Ms = 28.79
Ps = 30.17
Vs = 247.08

Ts = °F = °R (°F + 460)

$$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{}{13.6}$$

Ps = in. Hg

static = -1.8"

acfm = 727.7
dscfm = 340.8

$\overline{\sqrt{\Delta P}}$ =

$$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$$

$$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$$

Vs = ft^2

As = ft^2

static = -2.0

Qs = Vs × As × 60 s/m

Qs = × × 60

Qs = acfm

Qs = dscfm

$\sqrt{\Delta P}$ = 2.610
Ts = 631
Md = 29.24
Ms = 28.79
Vs = 247.7
acfm = 729.5
dscfm = 341.6

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FIELD DATA SHEET

50% load 4.7

Plant: Travis AFB
Sampling Location: Generator Outlet
Run Number: T-M5-501 Date: 6/12/02
Pretest Leak Rate: 0.002 cfm @ 10 in.Hg.
Pretest Leak Check: Pitot: ____ Orsat: ____

Sample Type: M5/202 Operator: AG
Pbar: 30.3 Ps: -2.2"
CO_2: 4 O_2: 15
Probe Length/Type: 2' Glass Pitot#: ____
Stack Diameter: 4" As: ____

Nozzle ID: 0.178 Thermocouple #: ____
Assumed Bws: 4 Filter #: 830 247
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: .004 cfm @ 5 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	0735	704.000										
	5	0740	707.89	2.1	1.4	1.4	607	254	252	46	59	58	1
	10	745	710.37	2.1	1.39	1.4	615	252	255	43	60	58	1
	15	750	713.86	2.1	1.39	1.4	618	253	253	43	62	58	1
	20	755	716.73	2.1	1.39	1.4	622	253	250	46	65	59	1
	25	800	720.15	2.1	1.39	1.4	624	253	254	47	67	60	1
	30	805	723.36	2.1	1.41	1.4	615	253	252	49	69	61	3
	35	810	726.33	2.1	1.41	1.4	616	252	251	50	71	62	3
	40	815	729.61	2.1	1.41	1.4	617	252	251	51	73	64	4
	45	820	732.79	2.1	1.43	1.4	611	252	250	52	74	65	4
	50	825	735.94	2.1	1.42	1.4	618	251	253	53	76	67	5
	55	830	739.23	2.1	1.42	1.4	619	254	251	53	77	68	5
	60	835	742.179	2.1	1.42	1.4	622	250	255	54	78	69	6

Acfm 714.5

dscfm 336.4

Iso 98

ΔVm = 38.179 $\sqrt{\Delta p}$ = 1.4491 $\overline{\Delta H}$ = 1.4 $\overline{Ts}$ = 617 $\overline{Tm}$ = 66

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB

Run No. T-M5-50-1

Date 6/12/02 Sample Box No. SB-2

Job No. 30174.0003.002

Sample Location Gen. 1 - 50%

Filter No. 830247

Train Preparer DA

Sample Recovery Person DA

Comments M5/202 train

Front Half

Acetone Container No. ______ Liquid Level Marked ______ Sealed ______

Filter Container No. ______ Sealed ______

Description of Filter Black

Samples Stored and Locked ______

Back Half/Moisture

Container No. ______

Liquid Level Marked ______ Sealed ______

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	DI H2O	100	720.6	767.5	46.9
2	"	"	735.7	714.8	-20.9
3	—	—	636.2	638.0	1.8
4	SG.	250	895.3	908.1	12.8
5					
6					
Total					40.6

Description of Impinger Catch: Cloudy

FIELD DATA SHEET

Plant: Travis AFB
Sampling Location: Generator Outlet
Run Number: T-MS-502 Date: 6-12-07
Pretest Leak Rate: .002 cfm @ 10 in.Hg.
Pretest Leak Check: Pitot: ____ Orsat: ____

Sample Type: MS/202 Operator: AWB
Pbar: 30.03 Ps: -2.2
CO_2: 6.5 O_2: 13.4
Probe Length/Type: 2 glass Pitot#: ____
Stack Diameter: 4" As: ____

Nozzle ID: .178 4.8 Thermocouple #: ____
Assumed Bws: 4% Filter #: PC028
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: .002 cfm @ 8 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	0850	742.552										
	5	0855	746.12	2.1	1.42	1.4	623	221	239	60	74	73	2
	10	0900	750.43	2.1	1.42	1.4	632	253	251	54	77	73	3
	15	0905	753.22	2.1	1.42	1.4	632	252	253	58	80	74	3
	20	0910	755.60	2.1	1.42	1.4	632	253	255	58	81	74	4
	25	0915	758.81	2.1	1.42	1.4	631	254	256	57	82	75	5
	30	0920	762.81	2.1	1.42	1.4	632	253	258	58	82	76	5
	35	0925	765.90	2.1	1.42	1.4	632	254	253	57	83	76	5
	40	0930	769.39	2.1	1.42	1.4	634	253	252	58	84	77	6
	45	0935	771.99	2.1	1.42	1.4	636	254	256	58	85	77	7
	50	0940	775.26	2.1	1.42	1.4	638	252	254	59	85	78	7
	55	0945	778.40	2.1	1.42	1.4	640	252	251	59	86	79	8
	60	0950	781.679	2.1	1.44	1.4	626	252	252	59	86	79	8

acfm 720.3
dscfm 333.7
Bso 98

ΔVm = 39.127 $\sqrt{\Delta p}$ = 1.4491 $\overline{\Delta H}$ = 1.4 $\overline{Ts}$ = 632 $\overline{Tm}$ = 79

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB Run No. T-5-50-2

Date 6/12/02 Sample Box No. 1 Job No. 30774.0003.002

Sample Location Generator #1 100% Filter No. PC028

Train Preparer DA

Sample Recovery Person DA

Comments

Front Half

Acetone Container No. ________ Liquid Level Marked ______ Sealed ________

Filter Container No. ________ Sealed ________

Description of Filter Black

Samples Stored and Locked ________

Back Half/Moisture

Container No. ________

Liquid Level Marked ________ Sealed ________

78 782.4

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H2O	100	724.7	782.4	57.7
2	"	100	731.9	701.6	-30.3
3	—	—	626.2	625.1	-1.1
4	SG.	250	845.9	861.8	15.9
5					
6					
Total					42.2

Description of Impinger Catch: Cloudy

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FIELD DATA SHEET 50% load 4.7

Plant: Travis AFB
Sampling Location: Generator Outlet
Run Number: T-M5-50-3 Date: 6-12-02
Pretest Leak Rate: .005 cfm @ 10 in.Hg.
Pretest Leak Check: Pitot: ____ Orsat: ____

Sample Type: M5/202 Operator: AWG
Pbar: 30.03 Ps: -2.2
CO_2: 6.5 O_2: ~~15~~ 14
Probe Length/Type: 2' glass Pitot#: ____
Stack Diameter: 4' As: ____

Nozzle ID: .178 Thermocouple #: ____
Assumed Bws: 4% Filter #: ____
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: .002 cfm @ 5 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1005	782.065										
	5	1010	785.56	2.1	1.42	1.4	639	249	247	63	82	81	1
	10	1015	788.75	2.1	1.43	1.4	636	250	247	63	85	81	1
	15	1020	792.27	2.1	1.43	1.4	635	252	250	63	86	81	3
	20	1025	795.37	2.1	1.43	1.4	635	251	252	61	87	81	3
	25	1030	799.01	2.1	1.43	1.4	636	253	251	60	88	81	3
	30	1035	802.22	2.1	1.43	1.4	638	254	254	59	87	81	4
	35	1040	805.69	2.1	1.43	1.4	637	253	254	59	86	82	4
	40	1045	808.90	2.1	1.44	1.4	627	252	251	58	86	81	4
	45	1050	812.22	2.1	1.44	1.4	626	252	254	58	86	81	5
	50	1055	815.40	2.1	1.44	1.4	626	254	252	59	85	80	5
	55	1100	818.68	2.1	1.44	1.4	627	254	251	59	85	80	6
	60	1105	821.726	2.1	1.43	1.4	633	253	251	60	85	80	6

acfm 720.3

dscfm 334.1

Iso 99

ΔVm = 39.661 $\sqrt{\Delta p}$ = ~~2.1~~ 1.4491 $\overline{\Delta H}$ = 1.4 $\overline{Ts}$ = 633 $\overline{Tm}$ = 83

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB Run No. T-5-50-3
Date 6/12/02 Sample Box No. SB-3 Job No. 830174.0003.002
Sample Location Gen. 1 — 50% Filter No. 830304
Train Preparer DA
Sample Recovery Person DA
Comments ______

Front Half
Acetone Container No. ______ Liquid Level Marked ______ Sealed ______

Filter
Container No. ______ Sealed ______

Description of Filter ______

Samples Stored and Locked ______

Back Half/Moisture
Container No. ______

Liquid Level Marked ______ Sealed ______

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H_2O	100	716.6	789.9	73.3
2	"	"	717.3	671.9	-45.4
3	—	—	623.1	623.1	0.0
4	SG.	250	843.7	856.7	13.0
5					
6					
Total					40.9 ✓

Description of Impinger Catch: ______

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Environmental Quality Management, Inc.

94535

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Travis AFB Date: 6/12/02
Sampling Location: Generator Outlet Clock Time: 1210
Run #: 75% Load Operators: RK/TG
Barometric Pressure, in.Hg: 30.30 Static Pressure, in.H_2O: -2.0
Moisture, %: ____ Molecular wt., Dry: ____ Pitot Tube, Cp: 0.99
Stack Dimension, in. Diameter or Side 1: 3" Side 2: ____
Wet Bulb, °F: ____ Dry Bulb, °F: ____
Pitot # ____ Thermocouple # ____

	Traverse Point Number	Velocity Head in.H_2O	Stack Temp, °F
@ 1210	1	7.6	732
	2	8.1	731
	3	8.4	734
	1	8.0	737
	2	8.4	738
	3	8.5	739
@ 1330	1	7.3	738
	2	7.7	738
	3	8.2	742
	1	7.7	738
	2	7.9	740
	3	8.2	740
	1	7.8	745
	2	7.9	747
	3	8.1	748
	1	7.7	743
	2	7.5	744
	3	7.8	743
		$\overline{\sqrt{\Delta P}}$ =	$\overline{T_s}$ =

$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 \times \% N_2)$

$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$

$Md =$

$Ms = Md \times \left(1 - \frac{\% H_2O}{100}\right) + 18\left(\frac{\% H_2O}{100}\right)$

Static = -2.0

$Ms = (\quad) \times \left(1 - \frac{}{100}\right) + 18\left(\frac{}{100}\right)$

$Ms =$

$\overline{Ts} =$ °F = °R(°F + 460)

$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{}{13.6}$

Ps = -2.5"

$Ps =$ in. Hg

$\overline{\sqrt{\Delta P}} =$

$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$

$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$

$Vs =$ ft^2

Ps = -2.5"

$As =$ ft^2

$Qs = Vs \times As \times 60 s/m$

$Qs = \quad \times \quad \times 60$

$Qs =$ acfm

$Qs =$ dscfm

FIELD DATA SHEET

75% load 5.9

Plant: Travis AFB
Sampling Location: Generator Outlet
Run Number: T-MS-75-1 Date: 6/12/02
Pretest Leak Rate: .003 cfm @ 10 in.Hg.
Pretest Leak Check: Pitot: ____ Orsat: ____

Sample Type: M5/202 Operator: ____
Pbar: 30.3 Ps: -25
CO_2: ~~[illegible]~~ 6 O_2: ~~[illegible]~~ 13
Probe Length/Type: 2' glass Pitot#: ____
Stack Diameter: 4" As: ____

Nozzle ID: .174 Thermocouple #: SH-7
Assumed Bws: 4% Filter #: 830224
Meter Box #: 7 Y: 1.004 ΔH@: 1.775
Post-Test Leak Rate: .004 cfm @ 10 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH		Stack Temp (Ts)	Temperature °F		Impinger Temp. °F	Dry Gas Meter Temp. Tm		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter		Inlet	Outlet	
	0	1120	822.039										
	5	1125	826.12	2.72	1.72	1.7	710	242	243	59	78	78	1
	10	1130	829.64	2.72	1.72	1.7	714	252	253	54	81	78	2
	15	1135	832.92	2.72	1.70	1.7	726	251	254	52	83	78	3
	20	1140	836.51	2.72	1.69	1.7	736	254	256	50	84	78	3
	25	1145	840.36	2.72	1.69	1.7	739	254	254	50	86	78	4
	30	1150	843.66	2.72	1.69	1.7	737	253	252	50	85	78	5
	35	1155	847.00	2.72	1.69	1.7	739	255	259	50	85	78	5
	40	1200	850.52	2.72	1.69	1.7	741	255	253	50	85	79	6
	45	1205	854.26	2.72	1.69	1.7	740	253	252	51	86	79	7
	50	1210	857.87	2.72	1.70	1.7	735	252	252	51	86	79	8
	55	1215	862.24	2.72	1.70	1.7	734	254	253	52	85	79	8
	60	1220	864.759	2.72	1.69	1.7	738	253	253	53	85	79	9

acfm 856.9
dscfm 359.3
Iso 104

ΔVm = 42.720 $\sqrt{\Delta p}$ = 1.6492 $\overline{\Delta H}$ = 1.7 $\overline{Ts}$ = 732 $\overline{Tm}$ = 81

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB Run No. T-5-75-1
Date 6/12/02 Sample Box No. SB-2 Job No. 30174.0003.002
Sample Location Gen. 1 - 75% Filter No. 830 224
Train Preparer DA
Sample Recovery Person DA
Comments

Front Half
Acetone Container No. ____ Liquid Level Marked ____ Sealed ____

Filter Container No. ____ Sealed ____

Description of Filter Black

Samples Stored and Locked ____

Back Half/Moisture
Container No. ____

Liquid Level Marked ____ Sealed ____

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	DI H_2O	100	714.7	784.1	69.4
2	"	100	736.3	711.9	-24.4
3	—	—	635.3	636.6	1.3
4	SG.	250	908.1	918.5	10.4
5					
6					
Total					56.7 ✓

Description of Impinger Catch: Cloudy

5.3

FIELD DATA SHEET

Plant: Travis AFB
Sampling Location: Generator Outlet
Run Number: T-MS-TS-2 Date: 6/12/02
Pretest Leak Rate: 0.003 cfm @ 12 in.Hg.
Pretest Leak Check: Pitot: N/A Orsat: N/A

Sample Type: MS/202 Operator: AK
Pbar: 30.20 Ps: -2.5
CO_2: 6.4 O_2: 12.5
Probe Length/Type: 2' Glass Pitot#: N/A
Stack Diameter: 8" As:

Nozzle ID: 0.178 Thermocouple #: SH-7
Assumed Bws: 4 Filter #: P0027
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: .004 cfm @ 12 in.Hg.
Post-Test Leak Check: Pitot: N/A Orsat: N/A

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)	
	0	1237	864.894											
	5	1242	868.4	2.71	1.68	1.70	736	240	248	64	78	78	3	
	10	1247	872.02	2.71	1.68	1.70	734	253	249	55	80	78	3	
	15	1252	875.81	2.71	1.68	1.7	737	253	254	57	83	78	4	atm
	20	1257	879.17	2.71	1.68	1.7	737	255	257	56	84	78	5	858.9
	25	1302	882.9	2.71	1.69	1.7	733	255	258	55	85	79	5	
	30	1307	886.2	2.71	1.69	1.7	734	251	254	55	86	79	6	Dsch
	35	1312	891.3	2.71	1.68	1.7	737	253	255	55	86	79	7	
	40	1317	893.6	2.71	1.68	1.7	739	251	253	55	87	79	8	359.8
	45	1322	897.0	2.71	1.68	1.7	741	253	249	55	87	82	9	
	50	1327	900.6	2.7	1.68	1.7	741	251	251	57	87	80	10	
	55	1332	905.44	2.7	1.68	1.7	742	251	251	57	87	80	11	750
	60	1337	907.740	2.7	1.69	1.7	736	253	254	60	87	81	12	99

ΔVm = 42.846 $\sqrt{\Delta p}$ = 1.6454 $\overline{\Delta H}$ = 1.7 $\overline{Ts}$ = 737 $\overline{Tm}$ = 82

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB
Run No. T-5-75-2
Date 6/11/02
Sample Box No. SB-1
Job No. 30174.0003.002
Sample Location Gen. #1 - 75%
Filter No. PC027
Train Preparer DA
Sample Recovery Person DA
Comments

Front Half
Acetone Container No.
Liquid Level Marked
Sealed

Filter Container No.
Sealed

Description of Filter Black

Samples Stored and Locked

Back Half/Moisture
Container No.

Liquid Level Marked
Sealed

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	DI H_2O	100	725.2	765.8	40.6
2	"	100	728.0	727.0	-1.0
3	—	—	625.0	625.6	0.6
4	SG	250	861.8	872.1	10.3
5					
6					
Total					50.5

Description of Impinger Catch: Cloudy

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FIELD DATA SHEET

75% load 6.5

Plant: Travis AFB
Sampling Location: Generator Outlet
Run Number: T-M5-75-3 Date: 6/12/02
Pretest Leak Rate: .004 cfm @ 10 in.Hg.
Pretest Leak Check: Pitot: N/A Orsat: N/A

Sample Type: M5/202 Operator: AWB
Pbar: 30.30 Ps: -2.5
CO_2: 4 6 O_2: ~~15~~ 13
Probe Length/Type: 2' Glass Pitot#: N/A
Stack Diameter: 4" As:

Nozzle ID: .178 Thermocouple #:
Assumed Bws: 4%
Filter #:
Meter Box #: 7 Y: 1.001 $\Delta H@$: 1.775
Post-Test Leak Rate: .004 cfm @ 10 in.Hg.
Post-Test Leak Check: Pitot: Orsat:

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)	
	0	1350	907.979											
	5	1355	911.5	2.7	1.65	1.7	751	210	235	65	81	80	1	acfm
	10	1400	914.74	2.7	1.65	1.7	747	252	251	58	85	81	2	859.1
	15	1405	919.00	2.7	1.65	1.7	745	252	253	55	88	81	2	
	20	1410	922.69	2.7	1.68	1.7	745	254	256	55	90	82	4	Dscfm
	25	1415	926.04	2.7	1.68	1.7	742	253	252	55	90	82	4	354.5
	30	1420	929.78	2.7	1.68	1.7	743	254	255	55	91	82	5	
	35	1425	933.95	2.7	1.68	1.7	746	253	252	56	91	83	6	Iso
	40	1430	937.09	2.7	1.69	1.7	741	254	254	56	91	83	7	101
	45	1435	940.80	2.7	1.68	1.7	746	253	256	57	91	83	8	
	50	1440	944.00	2.7	1.68	1.7	747	254	252	57	91	84	8	
	55	1445	948.13	2.7	1.69	1.7	742	254	253	57	92	84	8	
	60	1450	951.001	2.7	1.69	1.7	741	254	255	58	91	84	9	

$\Delta Vm =$ 43.022 $\sqrt{\Delta p} =$ 1.6432 $\overline{\Delta H} =$ 1.7 $\overline{Ts} =$ 745 $\overline{Tm} =$ 86

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB Run No. T-5-75-3

Date 6/12/02 Sample Box No. SB-3 Job No. 30174.0003.002

Sample Location Gen. #1 - 75% Filter No. 830243

Train Preparer DA

Sample Recovery Person DA

Comments

Front Half

Acetone Container No. ______ Liquid Level Marked ______ Sealed ______

Filter Container No. ______ Sealed ______

Description of Filter ______

Samples Stored and Locked ______

Back Half/Moisture

Container No. ______

Liquid Level Marked ______ Sealed ______

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H_2O	100	717.0	758.0	41.0
2	"	100	719.4	722.4	3.0
3	—	—	623.3	623.1	-0.2
4	SG.	250	876.0	894.4	18.4
5					
6					
Total					62.2 ✓

Description of Impinger Catch: ______

Environmental Quality Management, Inc.

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Travis AFB Date: 6/13/02
Sampling Location: Generator Outlet Clock Time: 0820
Run #: 100 % Load Operators: RK/TG
Barometric Pressure, in.Hg: 30.40 Static Pressure, in.H_2O: -2.5"
Moisture, %: 5 Molecular wt., Dry: ______ Pitot Tube, Cp: 0.99
Stack Dimension, in. Diameter or Side 1: 3" Side 2: ______
Wet Bulb, °F: ______ Dry Bulb, °F: ______
Pitot # ______ Thermocouple # ______

	Traverse Point Number	Velocity Head in.H_2O	Stack Temp, °F
@ 0820	1	10.3	806
	2	10.2	800
	3	10.5	798
	1	10.5	799
	2	11.0	806
	3	11.0	811
@ 0930	1	10.1	815
	2	10.0	817
	3	10.3	822
	1	10.3	818
	2	10.3	823
	3	10.5	825
@ 1045	1	10.3	822
	2	11.0	831
	3	11.0	835
	1	10.5	825
	2	10.3	826
	3	10.2	828
		$\overline{\sqrt{\Delta P}}$ =	$\overline{Ts}$ =

$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 \times \% N_2)$

$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$

$Md =$

$Ms = Md \times \left(1 - \frac{\% H_2O}{100}\right) + 18\left(\frac{\% H_2O}{100}\right)$

$Ms = (\quad) \times \left(1 - \frac{}{100}\right) + 18\left(\frac{}{100}\right)$

$Ms =$

$\overline{Ts} =$ °F = °R (°F + 460)

$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{}{13.6}$ static = -2.0"

$Ps =$ in. Hg

$\overline{\sqrt{\Delta P}} =$

$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$

$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$

$Vs =$ ft^2

$As =$ ft^2

$Qs = Vs \times As \times 60 s/m$ static = -3.0"

$Qs = \quad \times \quad \times 60$

$Qs =$ acfm

$Qs =$ dscfm

FIELD DATA SHEET

100% load 6.4

Plant: Travis AFB
Sampling Location: Generator Outlet
Run Number: T-M5-100-1 Date: 6/13/02
Pretest Leak Rate: .005 cfm @ 10 in.Hg.
Pretest Leak Check: Pitot: N/A Orsat: N/A

Sample Type: M5/202 Operator: AWB
Pbar: 30.4 Ps: -2.5
CO_2: 7 O_2: 11.5
Probe Length/Type: 2' glass Pitot#: N/A
Stack Diameter: 4" As:

Nozzle ID: .178 Thermocouple #: SH-5
Assumed Bws: 4% Filter #: 830248
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: .006 cfm @ 5 in.Hg.
Post-Test Leak Check: Pitot: Orsat:

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	0730	951.499										
	5	0735	955.46	3.2	1.89	1.9	734	254	254	46	54	54	0
	10	0740	959.18	3.2	1.82	1.8	785	253	254	46	57	54	0
	15	0745	962.57	3.2	1.81	1.8	794	252	253	50	60	55	0
	20	0750	966.42	3.2	1.82	1.8	798	253	251	52	63	56	0
	25	0755	970.03	3.2	1.81	1.8	802	252	252	52	65	57	1
	30	0800	973.32	3.2	1.81	1.8	806	252	252	53	67	58	2
	35	0805	977.24	3.2	1.81	1.8	809	252	251	55	69	59	3
	40	0810	980.64	3.2	1.82	1.8	808	252	253	54	71	61	4
	45	0815	984.35	3.2	1.83	1.8	804	252	251	55	73	62	4
	50	0820	987.90	3.2	1.83	1.8	812	252	250	56	74	64	5
	55	0825	991.37	3.2	1.84	1.8	810	252	252	55	75	66	5
	60	0830	994.984	3.2	1.83	1.8	815	252	253	56	76	67	5

acfm 952.7
dscfm 327.7
Iso 100

ΔVm = 43.485 $\sqrt{\Delta p}$ = 1.7889 $\overline{\Delta H}$ = 1.8 $\overline{Ts}$ = 799 $\overline{Tm}$ = 63

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB Run No. T5100 - 1

Date 6/13/12 Sample Box No. SB-5 Job No. 30174.0003.002

Sample Location Gen. 1 - 100% Filter No. 830248

Train Preparer DA

Sample Recovery Person DA

Comments

Front Half

Acetone Container No. Liquid Level Marked Sealed

Filter

Container No. Sealed

Description of Filter Black - Red particles from gasket Sealant

Samples Stored and Locked

Back Half/Moisture

Container No.

Liquid Level Marked Sealed

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H_2O	100	723.5	787.4	63.9
2	"	100	737.7	718.7	-19.0
3	—	—	632.2	635.5	3.3
4	SG	250	819.1	836.3	~~[illegible]~~ 17.2
5					
6					
Total					65.4

Description of Impinger Catch: Slight Yellow Tint

FIELD DATA SHEET

100% load 5-8

Plant: TRAVIS AFB
Sampling Location: Generator outlet
Run Number: T-MS-100-2 Date: 6/13/02
Pretest Leak Rate: .004 cfm @ 10 in.Hg.
Pretest Leak Check: Pitot: ____ Orsat: ____

Sample Type: MS/202 Operator: AWB
Pbar: 30.4 Ps: -2.5
CO_2: 7 O_2: 11.5
Probe Length/Type: 2' glass Pitot#: ____
Stack Diameter: 4" As: ____

Nozzle ID: .178 Thermocouple #: SH-47
Assumed Bws: 4% Filter #: PC015
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: .002 cfm @ 10 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	0845	995.111										
	5	0850	999.26	3.2	1.83	1.80	813	243	245	59	70	69	2
	10	0855	1002.16	3.2	1.84	1.80	814	252	251	63	74	70	3
	15	0900	1006.00	3.2	1.83	1.8	817	252	255	61	76	70	3
	20	0905	1009.44	3.2	1.84	1.8	815	252	251	58	78	71	4
	25	0910	1013.39	3.2	1.84	1.8	816	252	255	57	78	71	5
	30	0915	1017.01	3.2	1.84	1.8	815	253	254	58	78	72	5
	35	0920	1020.63	3.2	1.85	1.8	812	252	253	59	79	72	6
	40	0925	1024.42	3.2	1.87	1.9	802	253	252	62	79	72	7
	45	0930	1027.81	3.2	1.87	1.9	803	253	254	63	79	73	8
	50	0935	1032.33	3.2	1.87	1.9	804	254	254	65	80	73	9
	55	0940	1035.60	3.2	1.87	1.9	804	254	257	67	80	74	10
	60	0945	1038.642	3.2	1.86	1.9	807	255	253	67	81	74	11

acfm 955.9

dscfm 378.1

Iso 98

ΔVm = 43.531 $\sqrt{\Delta p}$ = 1.7889 $\overline{\Delta H}$ = 1.84 $\overline{Ts}$ = 810 $\overline{Tm}$ = 75

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB Run No. T-5-100-2

Date 6/13/02 Sample Box No. SB-1 Job No. 20174-003-002

Sample Location Gen. #1 — 100% Filter No. PC015

Train Preparer DA

Sample Recovery Person DA

Comments

Front Half

Acetone Container No. ______ Liquid Level Marked ______ Sealed ______

Filter Container No. ______ Sealed ______

Description of Filter Black

Samples Stored and Locked ______

Back Half/Moisture

Container No. ______

Liquid Level Marked ______ Sealed ______

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H_2O	100	729.2	801.1	71.9
2	"	100	733.8	705.8	-28.0
3	—	—	625.7	627.5	1.8
4	SG.	350	872.1	883.6	11.5
5					
6					
Total					57.2

Description of Impinger Catch: Slight Yellow tint in 1st Imp

FIELD DATA SHEET

100% load 6.8

Plant: Travis AFB
Sampling Location: Generator outlet
Run Number: T-MS-100-3 Date: 6-13-02
Pretest Leak Rate: .004 cfm @ 10 in.Hg.
Pretest Leak Check: Pitot: ____ Orsat: ____

Sample Type: MS/202 Operator: AWZ
Pbar: 30.4 Ps: -.25
CO_2: 7 O_2: 11.5
Probe Length/Type: 2' glass Pitot#: ____
Stack Diameter: 4" As: ____

Nozzle ID: .178 Thermocouple #: SH-47
Assumed Bws: 4% Filter #: 830229
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: .002 cfm @ 10 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1000	1039.110										
	5	1005	1043.19	3.2	1.85	1.9	818	223	200	66	77	76	1
	10	1010	1046.52	3.2	1.83	1.8	833	252	224	63	80	76	3
	15	1015	1050.44	3.2	1.83	1.8	836	251	244	56	83	77	4
	20	1020	1053.81	3.2	1.84	1.8	835	251	254	54	85	77	4
	25	1025	1050.08	3.2	1.83	1.8	839	252	252	53	86	78	5
	30	1030	1060.89	3.2	1.83	1.8	840	252	251	54	85	78	5
	35	1035	1064.89	3.2	1.83	1.8	839	253	257	54	84	78	6
	40	1040	1068.76	3.2	1.83	1.8	837	252	251	54	83	78	6
	45	1045	1072.04	3.2	1.83	1.8	837	254	249	54	83	77	7
	50	1050	1075.88	3.2	1.84	1.8	832	252	255	52	82	77	7
	55	1055	1079.39	3.2	1.85	1.9	824	252	258	51	82	77	8
	60	1100	1083.074	3.2	1.83	1.8	830	252	251	51	81	76	9

acfm
966.5
dscfm
371.4
750
100

ΔVm = 43.964 $\overline{\sqrt{\Delta p}}$ = 1.7889 $\overline{\Delta H}$ = 1.82 $\overline{Ts}$ = 833 $\overline{Tm}$ = 80

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Travis AFB Run No. T-5-100-3
Date 6/13/02 Sample Box No. SB-2 Job No. 30174.0003.002
Sample Location Generator #1 – 100% Filter No. 830229
Train Preparer DA
Sample Recovery Person DA
Comments

Front Half
Acetone Container No. Liquid Level Marked Sealed

Filter
Container No. Sealed

Description of Filter Blank

Samples Stored and Locked

Back Half/Moisture
Container No.

Liquid Level Marked Sealed

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	DI H2O	100	715.0	781.5	66.5
2	"	"	734.3	717.0	-17.3
3	—	—	636.3	636.4	0.1
4	SG	250	901.4	920.2	18.8
5					
6					
Total					68.1 ✓

Description of Impinger Catch: Yellow Tint – 1st Imp.

Environmental Quality Management, Inc.

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Travis AFB Date: 6/13/02
Sampling Location: Generator B Outlet Clock Time: ______
Run #: ______ Operators: RK/TG
Barometric Pressure, in.Hg: 30.40 Static Pressure, in.H_2O: ______
Moisture, %: ______ Molecular wt., Dry: ______ Pitot Tube, Cp: 0.99
Stack Dimension, in. Diameter or Side 1: 4" Side 2: ——
Wet Bulb, °F: ______ Dry Bulb, °F: ______
Pitot # ______ Thermocouple # ______

√ΔP = 1.180
Ts = 435°F

CO_2 = 3.3
O_2 = 16.7

	Traverse Point Number	Velocity Head in.H_2O	Stack Temp, °F
@ 1140	1	1.5	435
	2	1.4	435
	3	1.3	434
10%	1	1.25	433
	2	1.40	435
	3	1.5	436
@ 1220	1	1.8	500
	2	1.8	504
	3	1.6	505
25%	1	1.5	504
	2	1.8	505
	3	1.6	504
@	1	2.0	636
	2	2.1	636
	3	2.2	634
	1	2.3	633
50%	2	2.5	625
1240	3	2.0	616
		$\overline{\sqrt{\Delta P}}$ =	$\overline{Ts}$ =

$$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 \times \% N_2)$$

$$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$$ Vs = 101.2

Md =

$$Ms = Md \times \left(1 - \frac{\% H_2O}{100}\right) + 18\left(\frac{\% H_2O}{100}\right)$$

Static = -0.75"
acfm = 530
dscfm = 304

$$Ms = (\quad) \times \left(1 - \frac{}{100}\right) + 18\left(\frac{}{100}\right)$$

Ms =

√ΔP = √1.296
Ts = 504

$\overline{Ts}$ = °F = °R(°F + 460)

CO_2 = 4.0
O_2 = 15.7

$$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{}{13.6}$$

Static = -0.90"
4.1%

Ps = in. Hg

acfm = 603.4
dscfm = 321.4

$\overline{\sqrt{\Delta P}}$ =

$$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$$

√ΔP = 1.476
Ts = 630

$$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$$

Vs = ft^2

CO_2 = 5.0 O_2 = 14.0
Static = -1.20"

As = ft^2

Moisture 4.7%

Qs = Vs × As × 60 s/m

Qs = × × 60

VS = 139.6

Qs = acfm

acfm = 730.8

Qs = dscfm

dscfm = 341.8

EQ *Environmental Quality Management, Inc.*

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Travis AFB Date: 6/13/02
Sampling Location: Clock Time:
Run #: Generator B Outlet Operators: RK/TG
Barometric Pressure, in.Hg: 30.40 Static Pressure, in.H_2O:
Moisture, %: Molecular wt., Dry: Pitot Tube, Cp: 0.99
Stack Dimension, in. Diameter or Side 1: 4" Side 2:
Wet Bulb, °F: Dry Bulb, °F:
Pitot # Thermocouple #

$\sqrt{\Delta P} = 1.622$
$T_s = 707$

@ 1310

	Traverse Point Number	Velocity Head in.H_2O	Stack Temp, °F
	1	2.5	700
	2	2.6	709
	3	2.5	709
75%	1	2.7	710
	2	2.7	711
	3	2.8	700
	1	3.1	750
	2	3.7	740
	3	3.3	753
100%	1	3.2	759
	2	2.8	~~8~~ 762
	3	3.2	765
		$\sqrt{\Delta P}$ =	$\overline{Ts}$ =

$Md = (0.44 \times \%\,CO_2) + (0.32 \times \%\,O_2) + (0.28 \times \%\,N_2)$

$CO_2 = 6.0$
$O_2 = 12.5$

$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$

Static = Moisture = 6.0

Md =

$Ms = Md \times \left(1 - \frac{\%H_2O}{100}\right) + 18\left(\frac{\%H_2O}{100}\right)$

−1.7"

Vs = 158.9
acfm = 832
dscfm = 358.2

$Ms = (\quad) \times \left(1 - \frac{}{100}\right) + 18\left(\frac{}{100}\right)$

Ms =

$\overline{Ts} =$ °F = °R(°F + 460)

$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{}{13.6}$

CO_2 = ~~6.0~~ 7.0
O_2 = ~~12.5~~ 11.5
$\sqrt{\Delta P} = 1.79$
$T_s = 755$°F

Ps = in. Hg

static = −1.6"

Moisture = ~~6.0~~ 6.3

$\sqrt{\Delta P}$ =

$Vs = 85.49 \times Cp \times \sqrt{\Delta P} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$

vs = 178.8
acfm = 936.4
dscfm = 386

$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$

Vs = ft^2

As = ft^2

Qs = Vs × As × 60 s/m

Qs = × ×60

Qs = acfm

Qs = dscfm

Method 0011 Composite

FIELD DATA SHEET

1.746
K: ~~1.656~~

Plant: TRAVIS AFB
Sampling Location: Generator Outlet
Run Number: T-0011-Comp Date: 6/11/02
Pretest Leak Rate: 0.002 cfm @ 15 in.Hg.
Pretest Leak Check: Pitot: N/A Orsat: N/A

Sample Type: ALD/KEY Operator: A.G.
Pbar: 30.30 Ps: -1.2" / -2.0"
CO_2: ~~4~~ O_2: ~~4~~/15
Probe Length/Type: 2' Glass Pitot#: N/A
Stack Diameter: 4" As:

Nozzle ID: 0.190 Thermocouple #: ~~N/A~~
Assumed Bws: 4 Filter #: N/A
Meter Box #: 4 Y: 1.004 ΔH@: 1.640
Post-Test Leak Rate: 0.005 cfm @ 3 in.Hg.
Post-Test Leak Check: Pitot: Orsat:
0.008 at 3"

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
10% 0	0	0815	592.948										
Load 1	5	0820	—	1.73	1.68	1.70	498	241	250	50	85	84	1
2	10	0825	600.1	1.73	1.8	1.80	464	240	250	50	86	84	1
3	15	0830	605.3	1.73	1.77	1.80	468	242	249	48	88	85	1
4	20	0835	[illegible]	1.73	1.79	1.80	465	250	250	49	92	89	1
5	25	0840	612.38	1.73	1.78	1.80	468	250	248	49	93	86	1
6	30	0846	615.358	1.73	1.78	1.80	471	250	252	49	96	87	1
25% Load 1	35	1313	619.6	2.0	1.9	1.9	558	251	249	68	92	92	1
2	40	1318	624.2	2.0	1.9	1.9	558	253	249	57	92	92	1
3	45	1323	—	2.0	1.9	1.9	556	250	250	58	95	92	2
4	50	1328	631.6	2.0	1.9	1.9	557	250	250	61	98	93	2
5	55	1333	635.1	2.0	1.9	1.9	560	248	250	61	98	93	2
6	60	1338	638.970	2.0	1.9	1.9	560	251	250	62	100	94	2
		0750	639.197							~~62~~	~~101~~	~~94~~	~~2~~
1	65	0755	642.8	2.1	1.8	1.8	608	250	248	50	62	61	2
2	70	0800	646.5	2.1	1.8	1.8	615	252	249	44	64	62	2
3	75	0805	650.8	2.1	1.8	1.8	616	250	257	44	67	62	2
4	80	0810	654.2	2.1	1.8	1.8	619	250	252	47	71	64	2
5	85	0815	657.5	2.1	1.8	1.8	617	250	245	47	73	64	2
6	90	0820	661.322	2.1	1.8	1.8	618	249	253	48	75	66	2
										~~48~~			

10% Load

615.660 start at 1308

6/12/02 50% Load

ΔVm = 92.385 $\sqrt{\Delta p}$ = 1.456 $\overline{\Delta H}$ = 1.896 $\overline{Ts}$ = 594 $\overline{Tm}$ = 81

page 2

FIELD DATA SHEET

Plant: Travis AFB
Sampling Location: Generator Outlet
Run Number: 7-001-Comp Date: 6/12/02
Pretest Leak Rate: ___ cfm @ __ in.Hg.
Pretest Leak Check: Pitot: ____ Orsat: ____

Sample Type: Aldehydes/Ketones Operator: sh
Pbar: 30.3 Ps: - 2.00
CO_2: 4 O_2: 15
Probe Length/Type: 2' Glass Pitot#: ____
Stack Diameter: 3" As: ____
4" at port

Nozzle ID: .190 Thermocouple #: ____
Assumed Bws: 4 Filter #: —
Meter Box #: 4 Y: 1.004 ΔH@: 1.64
Post-Test Leak Rate: ____ cfm @ ____ in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

15% Load

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head.	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
0	90	1125	661.322										
1	95	1130	665.3	2.71	2.1	2.1	717	250	232	58	75	75	2
2	100	1135	669.3	2.71	2.1	2.1	715	253	252	48	75	75	2
3	105	1140	674.0	2.7	2.1	2.1	736	252	251	48	77	76	2
4	110	1145	677.6	2.7	2.1	2.1	738	251	247	50	80	75	2
5	115	1150	681.6	2.7	2.1	2.1	738	249	252	51	82	75	2
6	120	1155	685.333	2.7	2.1	2.1	740	251	255	53	84	76	2

ΔVm = ____ $\overline{\sqrt{\Delta p}}$ = ____ $\overline{\Delta H}$ = ____ $\overline{Ts}$ = ____ $\overline{Tm}$ = ____

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

T-0011-Comp

Plant Travis AFB Run No. Train

Date 6/11/02 Sample Box No. HSB-3 Job No. 30174.0003.002

Sample Location Generator Outlet Filter No. NA

Train Preparer RK

Sample Recovery Person RK

Comments Method 0011 Composite

Front Half

Acetone Container No. ________ Liquid Level Marked ______ Sealed ________

Filter Container No. ________ Sealed ________

Description of Filter ________

Samples Stored and Locked ________

Back Half/Moisture

Container No. ________

Liquid Level Marked ________ Sealed ________

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	DNPH	100	714.1	774.2	60.1
2	DNPH	100	724.9	741.5	16.6
3	DNPH	100	709.3	711.5	2.2
4	Silica Gel	250	845.5	865.6	20.1
5					
6					
Total					99.0 ✓

TD

Description of Impinger Catch: ________

Environmental Quality Management, Inc

VOST

EPA METHOD 30
VOLATILE ORGANIC SAMPLING TRAIN (VOST) SAMPLING DATA

Company: Travis AFB
Date: 6/11/02
Time:
Meter #: VB-1
Barometric Pressure, in.Hg: 30.30
Ambient Temperature, °F: 85

City: Fairfield Ca
Location: Generator Outlet
Run #: T-0030-Comp
Y-Factor:
Operator: [illegible]
Purge Time:

Vacuum Leak Check Data

	Initial, in.Hg	Final, in.Hg	Time, min.
Pre-test:	25	25	2
Post-test:			

Sample Time (min)	Clock Time, (24-hr)	Meter Volume, (liter)	Rotameter Setting	Dry Gas Meter Temp., (°F) In	Dry Gas Meter Temp., (°F) Out	Vacuum, (in.Hg)	Probe Temp, °F
0	0856	6109.58	0.3	86	86	1	240
5	0901	6110.5	0.3	87	87	1	245
10	0906	6111.7	0.3	88	88	1	241
15	0911	6113.25	0.3	90	90	1	240
20	1315	6115.0	0.3	104	103	1	240
25	1320	6116.2	0.3	104	104	1	240
30	1325	6117.3	0.3	105	104	1	242
	0753		~~0.3~~	~~60~~	~~60~~	~~1~~	~~240~~
35	0758	6118.4	0.3	60	60	1	240
40	0803	6119.4	0.3	61	61	1	240
45	0808	6120.4	0.3	62	62	1	240
50	0138	6121.6	0.3	83	82	1	240
55	1143	6122.7	0.3	84	84	1	240

10%

stop restart at 1310

25%

6/12/02

50%

75%

Nitrogen purge/activated carbon packing in sample holding container:

60 1148 6123.82 0.3 85 84 1 240

$$V_{std} = V_m\,(\text{liters}) \times Y \times 17.647 \times \frac{P_b\,(\text{in.Hg})}{T_m\,(^\circ R)}$$

V_{std}

ΔVM 14.24

TM 84

Environmental Quality Management, Inc

PAH

EPA METHOD 30
VOLATILE ORGANIC SAMPLING TRAIN (VOST) SAMPLING DATA

Company: Travis AFB
Date: 6/11/02
Time:
Meter #: UB-2
Barometric Pressure, in.Hg: 30.30
Ambient Temperature, °F: 85

City: Fairfield, Ca
Location: Generator Outlet
Run #: T-PAH-Comp
Y-Factor:
Operator: [illegible]
Purge Time:

Vacuum Leak Check Data

	Initial, in.Hg	Final, in.Hg	Time, min.
Pre-test:	25	25	1
Post-test:			

Sample Time (min)	Clock Time, (24-hr)	Meter Volume, (liter)	Rotameter Setting	Dry Gas Meter Temp., In (°F)	Dry Gas Meter Temp., Out (°F)	Vacuum, (in.Hg)	Probe Temp, °F
0	0856	5117.08	0.3	84	82	1	—
5	0901	5118.2	0.3	86	83	1	—
10	0906	5119.4	0.3	88	84	1	—
15	0911	5120.45	0.3	89	86	1	—
20	1315	5122.0	0.3	108	108	1	—
25	1320	5123.1	0.2	104	101	1	—
30	1325	5123.8	0.3	104	103	1	—
	0753						
35	0758	5124.9	0.3	62	59	1	—
40	0803	5125.8	0.3	63	60	1	—
45	0808	5126.0	0.3	65	61	1	—
50	1138	5128.3	0.3	85	82	1	—
55	1143	5129.2	0.3	86	84	1	

10%

stop

restart at 1310

50% →

75%

Nitrogen purge/activated carbon packing in sample holding container:

60 1148 5130.60 0.3 88 85 1

$$V_{std} = V_m(\text{liters}) \times Y \times 17.647 \times \frac{P_b(\text{in.Hg})}{T_m(°R)}$$

V_{std}

ΔVm 13.52

$\overline{Tm}$ 84

N:\Forms\Forms\Emission Testing\EPA Method 30 VOST Sampling Data.doc

CEM CALIBRATION DATA SHEET

Company: Trans APB
Location: Generator 1
Project No:

Operator: D. Allen
Date: 6/11/02

		Cal Gas Conc.	Direct Calibration Response ppm / %	% Error	Post Test Run 1 Response ppm / %	%Drift	%Bias	Post Test Run 2 Response ppm / %	%Drift	%Bias	Post Test Run 3 Response ppm / %	%Drift	%Bias	Comments
			Time: 715		Time: 817-917			Time: 1010-1050			Time: 1135-1215			
NOx	Zero	0	-1	0.1	0			0.1			1.1			
	Low	—	—	—										
	Mid	448	443	441	441			440			438			
	High	885.5	886	879										
CO	Zero	0	0.3	0.4	0.3			0.4			0.2			
	Low	30.1	30.3	29.9										
	Mid	59.4	59.1	59.1	58.9			58.7			58.3			
	High	149.4	150.4	150.4										
THC (Methane)	Zero	0	-0.2	-0.1	[illegible]	(0.1)	4.0	4.5	(0.3)		3.8	(0.3)		
	Low	49.6	50.3	50.2	54.2	(50.1)		54.3	(49.4)		51.7	(49.0)		
	Mid	124.6	125	126										
	High	298.6	300	299										
O_2	Zero	0	0.0	0.0	0.0			0.0			0.0			
	Low	—	—	—										
	Mid	10.5	10.5	10.5	10.5									
	High	20.0	20.0	20.0	20.0			20.0			20.0			
CO_2	Zero	0	0.0	-0.1	0.0			-0.0			-0.2			
	Low	9.9	10.0	10.0	10.0			10.0			9.9			
	Mid	20.5	20.4	20.3	20.4									
	High	—	—	—										

CEM CALIBRATION DATA SHEET

Company: Travis AFB
Location: Gen. 1 - 25%
Project No: 30174.0003.002

Operator: D. Allen
Date: 6/11/02

		Cal Gas Conc.	Direct Calibration Response ppm / %	Direct Calibration Response % Error	Post Test Run 1 Response ppm / %	Post Test Run 1 %Drift	Post Test Run 1 %Bias	Post Test Run 2 Response ppm / %	Post Test Run 2 %Drift	Post Test Run 2 %Bias	Post Test Run 3 Response ppm / %	Post Test Run 3 %Drift	Post Test Run 3 %Bias	Comments
			Time: 7/5/1220		Time: 1304-1344			Time: 1420-1500			Time: 1535-1615			
NOx	Zero	0	-1	1.1	0.1			0.0			-0.1			
	Low	—	—											
	Mid	448	443	438	435			435			434			
	High	885.5	886											
CO	Zero	0	0.3	0.2	0.2			0.2			0.1			
	Low	30.1	30.3											
	Mid	59.4	59.1	58.3	57.7			57.8			57.7			
	High	149.4	150.4											
THC (Methane)	Zero	0	-0.2	3.8	~~4.8~~ 3.6	(0.2)		1.9	(6.3)		1.3 ~~2.9~~	(0.1)		
	Low	49.6	50.3	51.7	51.6	(48.7)		51.2	(50.9)		50.6	(48.9)		
	Mid	124.6	125	3										
	High	298.6	300											
O_2	Zero	0	0.0	0.0	0.0			0.0			0.0			
	Low	—	—											
	Mid	10.5	10.5											
	High	20.0	20.0	20.0	20.0			20.0			20.0			
CO_2	Zero	0	0.0	-0.2	-0.1			-0.2			-0.2			
	Low	9.9	10.0	9.9	9.9			9.9			9.9			
	Mid	20.5	20.4											
	High	—	—											

CEM CALIBRATION DATA SHEET

Company: Travis AFB
Location: Gen. 1 - 50%
Project No: 30174.0003.002

Operator: D. All
Date: 6/12/07

		Cal Gas Conc.	Direct Calibration Response ppm / %	Direct Calibration Response % Error	Post Test Run 1 Response ppm / %	Post Test Run 1 %Drift	Post Test Run 1 %Bias	Post Test Run 2 Response ppm / %	Post Test Run 2 %Drift	Post Test Run 2 %Bias	Post Test Run 3 Response ppm / %	Post Test Run 3 %Drift	Post Test Run 3 %Bias	Comments
			Time: 640		Time: 733-813			Time: 851-931			Time: 1005-1045			
	Zero	0	0.0	0.0	1.0			1.0			1.0			
NOx	Low	—												
	Mid	448		442	442			442			441			
	High	885.5	880	880										
	Zero	0	0.6	0.6	0.6			0.6			0.6			
CO	Low	30.1		30.3										
	Mid	59.4		59.9	59.7			59.7			59.6			
	High	149.4	152.2	152.2										
	Zero	0	-0.5	(-0.6)	~~3.5~~	(0.8)		4.6	(-0.9)		4.8	(-1)		
THC	Low	49.6		0.5(-1) 49.8	51.2	(47)		50.4	(47)		50.0	(46)		
(Meth)	Mid	124.6		124.5										
	High	298.6	299	299										
	Zero	0	0.0	0.0	0.0	~~0.0~~		-0.1			-0.1			
O2	Low	—												
	Mid	10.5	10.5	10.5										
	High	20.0		20.1	20.1			20.1			20.1			
	Zero	0	-0.1	-0.2	-0.2			-0.2			-0.1			
CO2	Low	—												
	Mid	9.9		10.1	10.1			10.1			10.1			
	High	20.5	20.5	20.5										

CEM CALIBRATION DATA SHEET

Company: Travis AFB
Location: Gen. 1 - 75%
Project No: 30174.0003.002

Operator: D. All[illegible]
Date: 6/17/02

		Cal Gas Conc.	Direct Calibration Response		Post Test Run 1 Response			Post Test Run 2 Response			Post Test Run 3 Response			Comments
			ppm / %	% Error	ppm / %	%Drift	%Bias	ppm / %	%Drift	%Bias	ppm / %	%Drift	%Bias	
			Time: 640		Time: 1121-1201			Time: 1238-1318			Time: 1351-1431			
NO_x	Zero	0	0	1.0	1.0			1.0			1.0			
	Low													
	Mid	448	442	441	438			[illegible]	437		436			
	High	885.5	880											
CO	Zero	0	0.6	0.6	0.6			0.6			0.4			
	Low	30.1												
	Mid	59.4	59.9	59.6	59.3			59.1			58.7			
	High	149.4	152.2											
THC (MeH)	Zero	0	-0.5		4.0	(-1)		3.6	(-1)		4.0	(-1)		
	Low	49.6	49.8	50.0	50.9	(46)		49.5	(45)		50.5	(45)		
	Mid	124.6	124.5											
	High	298.6	299											
O_2	Zero	0	0.0		-0.1			-0.1			-0.1			
	Low	—												
	Mid	10.5	10.5											
	High	20.0	20.1	20.1	20.0			20.0			20.0			
CO_2	Zero	0	-0.1		+0.2			-0.2			-0.2			
	Low	—												
	Mid	9.9	10.1	10.1	10.1			10.1			10.1			
	High	20.5	20.5											

CEM CALIBRATION DATA SHEET

Company: Travis AFB
Location: Gen.#1-100%
Project No: 30174-0003.002

Operator: D. Alh
Date: 6/13/02

		Cal Gas Conc.	Direct Calibration Response ppm / %	% Error	Post Test Run 1 Response ppm / %	%Drift	%Bias	Post Test Run 2 Response ppm / %	%Drift	%Bias	Post Test Run 3 Response ppm / %	%Drift	%Bias	Comments Gen. #2
			Time: 650		Time: 731-811			Time: 845-925			Time: 1000-1040			
	Zero	0	-1	0.0	2.0			3.1			4.0			1.0
NOx	Low	—												
	Mid	448		442	443			442			441			440
	High	885.5	881	879										
	Zero	0	0.6	0.6	0.8			0.6			0.8			0.6
CO	Low	30.1		30.5										
	Mid	54.4		54.9										
	High	149.4	152	152	152			152			151			152
	Zero	0	0	0.6	4.2	(-1)		3.5	(-1)		4.3	(-1)		8.4 (-1)
THC	Low	49.6		48.0	48.9	(45)		46.9	(45)		47.7	(42)		55.6 (44)
(meth)	Mid	124.6		122										
	High	298.6	295	290										
	Zero	0	0.0	0.0	0.0			0.0			0.0			0.0
O2	Low	—												
	Mid	10.5	10.7	10.6	10.6			10.6			10.6			10.6
	High	20.0		20.1										
	Zero	0	-0.2	-0.1	0.1			-0.1			0.0			-0.1
CO2	Low	—												
	Mid	9.9		10.0										
	High	20.5	20.7	20.6	20.6			20.6			20.5			20.6

CLIENT Travis AFB
LOCATION Generator 1
SUBJECT 6/11/02 - 10% & 25%

EQ

PN ____ Sheet No. ____
Checked By ____ Date ____
Computed By ____ Date ____

10% Gallons Fuel: 3 Gal/hr HP: 68 All Runs

T-10-1

Time	NOx	CO	THC	CO2	O2	Moist
817-917	146.8 (NO2 - 20)	81.68	53.81	3.114	16.697	1.95

Fuel: 2.7 Gal/hr HP:

T-10-2 1010-1050	158.4 (NO2 - 20)	81.64	53.91	3.212	16.587	1.61

Fuel: 2.8 HP:

T-10-3 1135-1215	160.5 (20)	88.0	53.4	3.26	16.451	1.68

~~10~~ 25% Gallons Fuel: 3.3 HP:

T-~~10~~25-1 1304-1344 - Probe out of stack ~1325	179.3 (10)	76.91	42.62	3.575	15.922	1.58

Fuel: 3.7 HP:

T-~~10~~25-2 1420-1500 - Probe out ~1445	190.0 (7)	85.03	40.3	3.993	15.526	1.43

Fuel: 3.6

T-~~10~~25-3 1535-1615	163.3 (6)	87.47	39.59	3.890	15.516	1.40

dscfm · MW · ppm × .000000155

$$\frac{ppm\ wet}{\left(1 - \frac{\%}{100}\right)}$$

lb/hr lb/Gal lb/HP

CLIENT Travis AFB
LOCATION Gen. #1
SUBJECT 50% & 75%
6/12/02

PN ______ Sheet No. ______
Checked By ______ Date ______
Computed By ______ Date ______

T-50-1 HP - 91

Time	NOx	CO	THC	CO_2	O_2	Meth.	Fuel (gal/hr)
733-813	229 (17 NO_2)	84.79	40.81	4.902	14.238	0.34	4.7

T-50-2

851-931	233.8	89.69	43.24	4.942	14.161	0.29	5.1

T-50-3

1005-1045	235.9	91.92	41.77	4.952	14.155	0.27	5.2

T-75-1 HP - 100

1121-1201	338.6	114.52	39.52	5.948	12.841	0.06	5.5

T-75-2 ~~34~~

1238-1318	342.8	116.12	36.37	6.047	12.688	-0.1	5.5

T-75-3

1351-1431	347.2	121.17	35.08	6.092	12.616	-0.11	5.8

"Rough" 100% Data

1503-1512	544.5	196.2	30.35	7.107	11.143	-0.13	

CLIENT Travis AFB

LOCATION Gen#1100 / 142-A11

SUBJECT 6/13/02

EQ

PN ______ Sheet No. ______

Checked By ______ Date ______

Computed By ______ Date ______

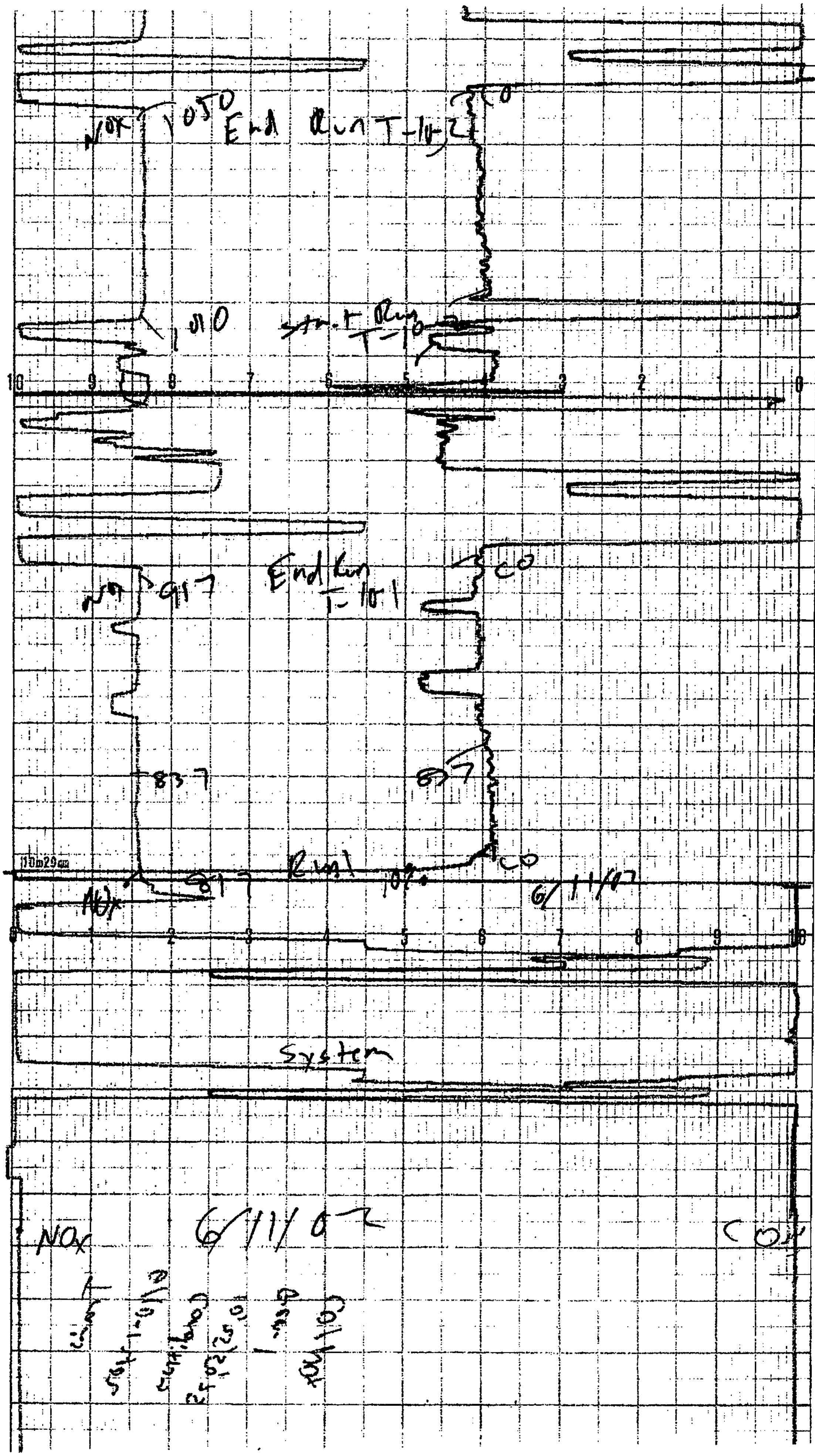
T-100-1 Time	NOx	CO	THC	HP-125 CO2	O2	Mcflow	Fuel (gal/hr) / Flow (dscfm)
731-811	472.4	136.84	30.57	6.902	11.660	-0.25	~~7.0~~ 6.4
T-100-2 845-925	499.6	161.62	26.64	7.059	11.414	-0.28	7.8
T-100-3 1000-1040	515.4	167.83	25.03	7.114	11.325	-0.31	
T-2-~~80~~ 1140-1200	209.2	155.14	93.06	3.293	16.670	1.34	304
T-2-25 1213-1233	221.2	143.65	82.90	3.969	15.672	0.92	321.4
T-2-50 1243-1303	260.9	142.98	66.54	5.343	13.735	0.49	341.8
T-2-75 1310-1330	336.4	149.41	56.06	6.020	12.818	0.20	358.2
T-2-100 1341-1401	441.2	167.55	46.27	6.367	12.350	0.02	386.0

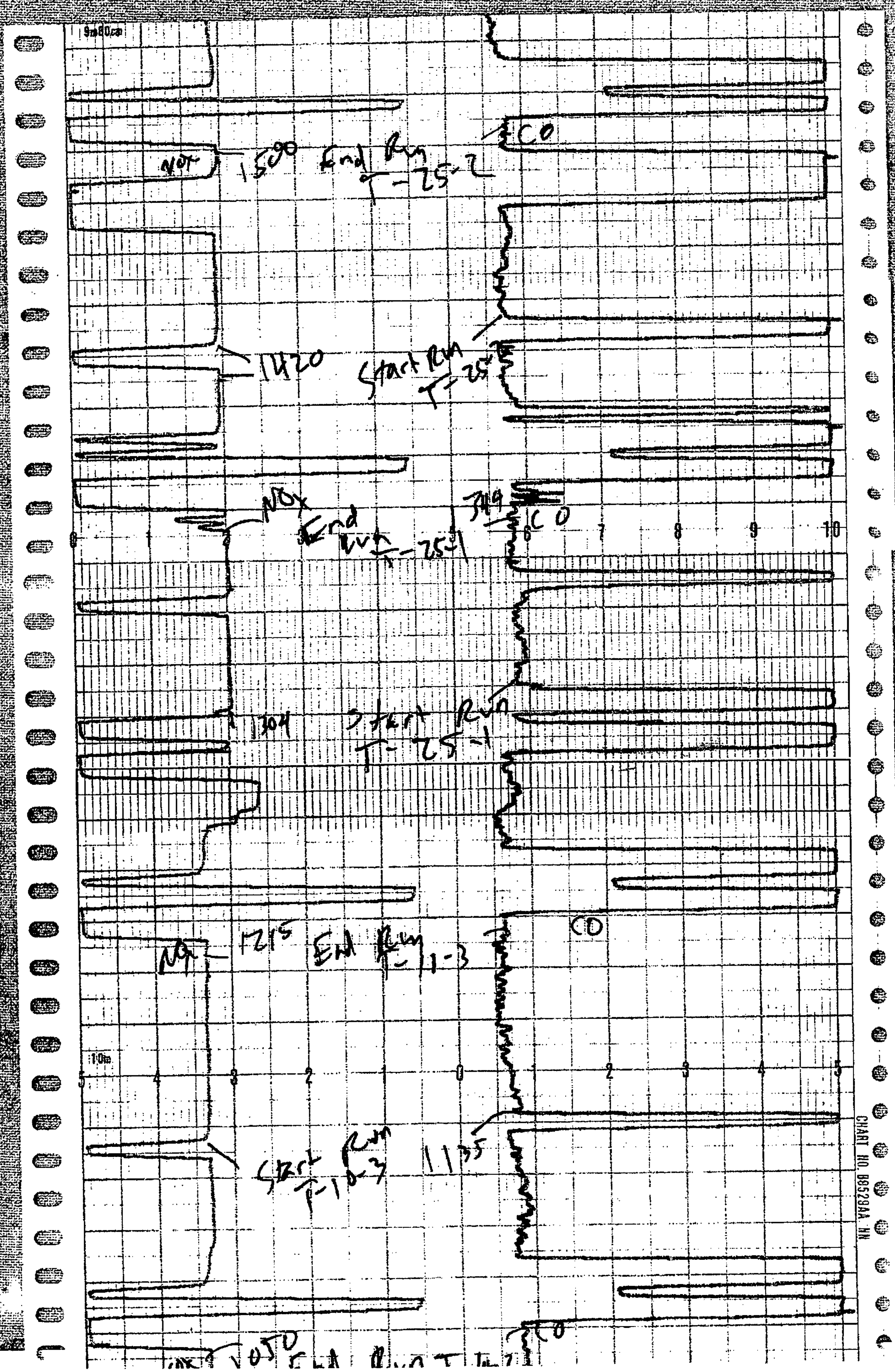
Travis

6/10-12/02

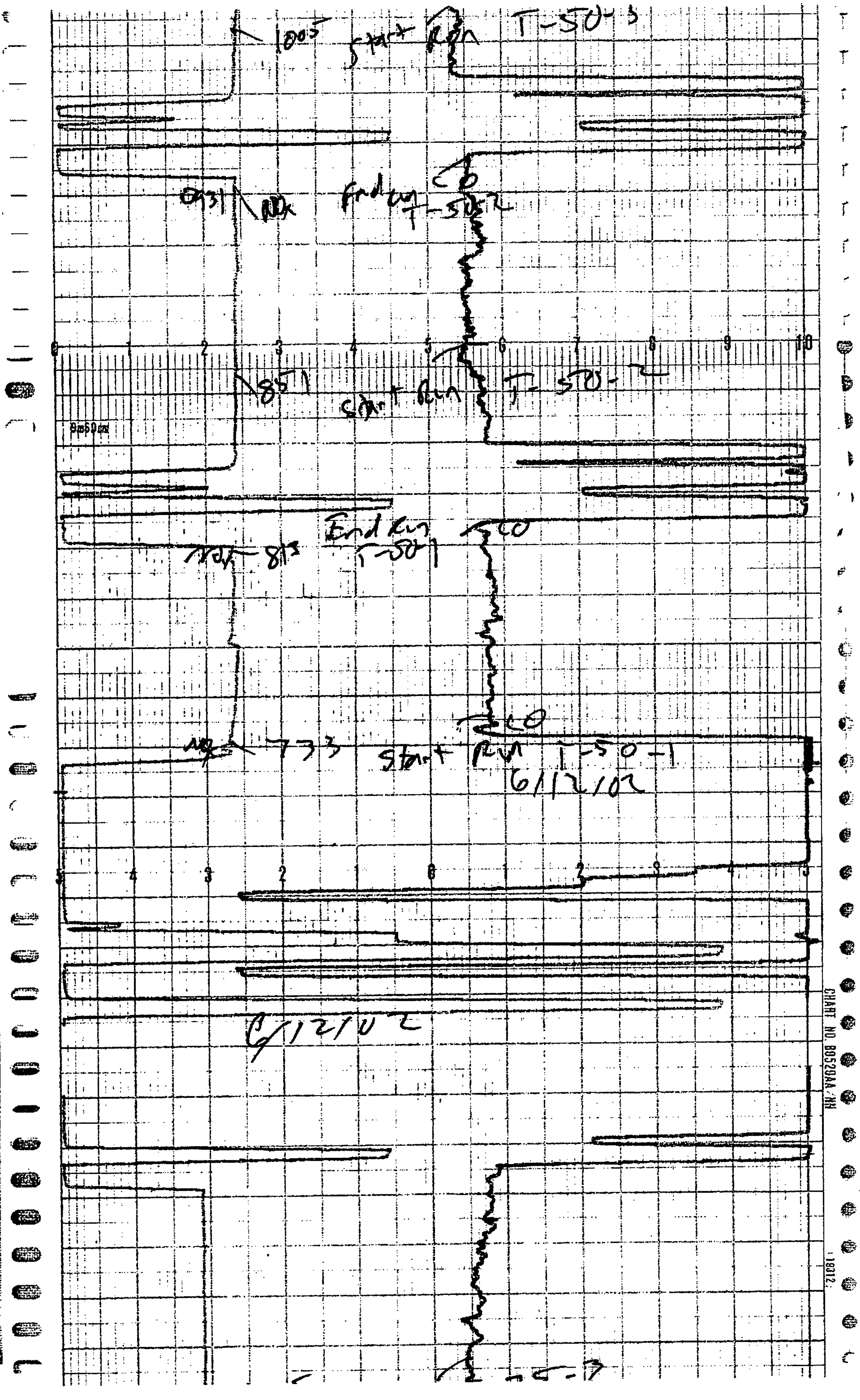
Conditions
10,25,50,75
Gen. 1

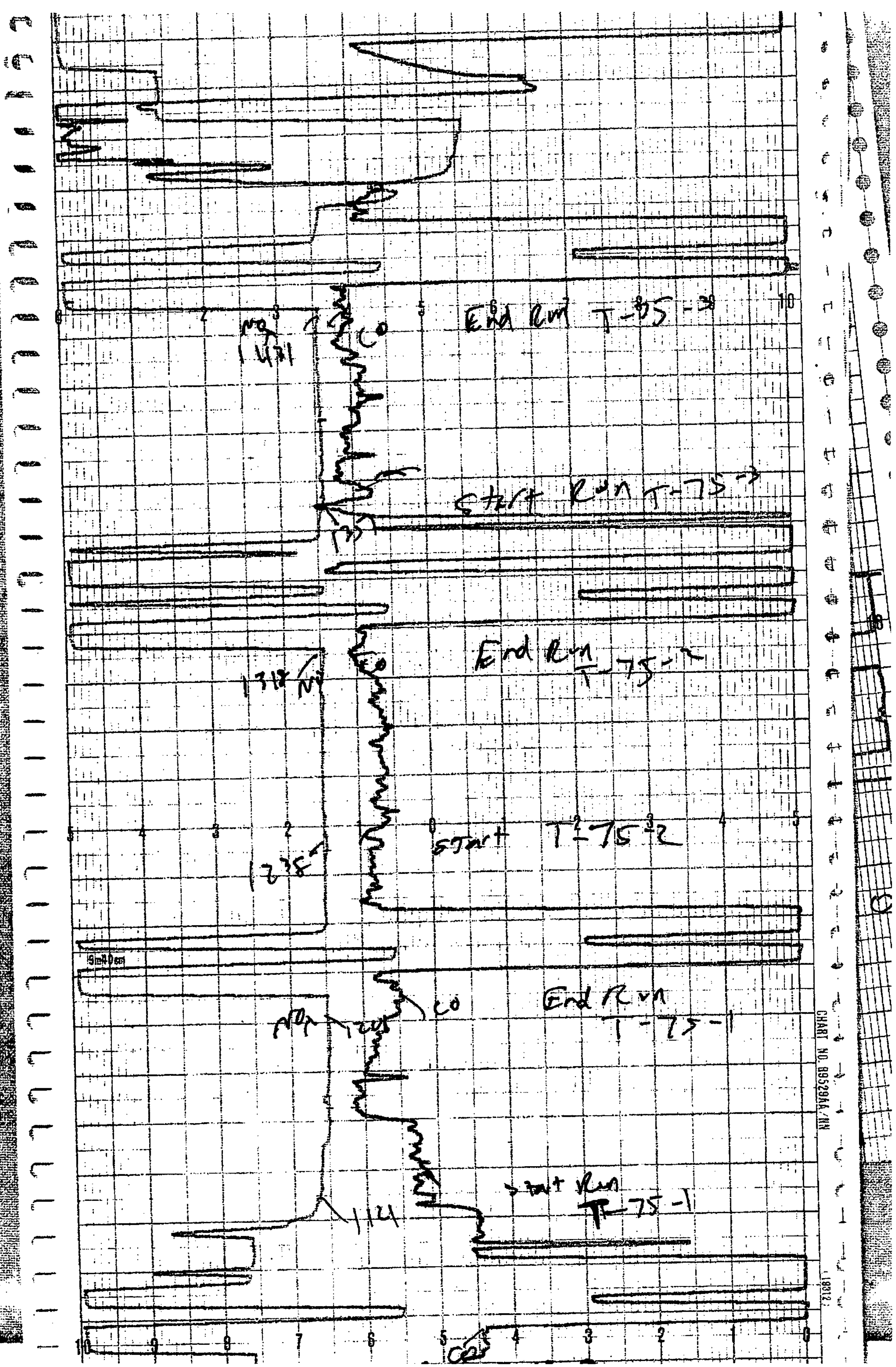
CO_2/THC

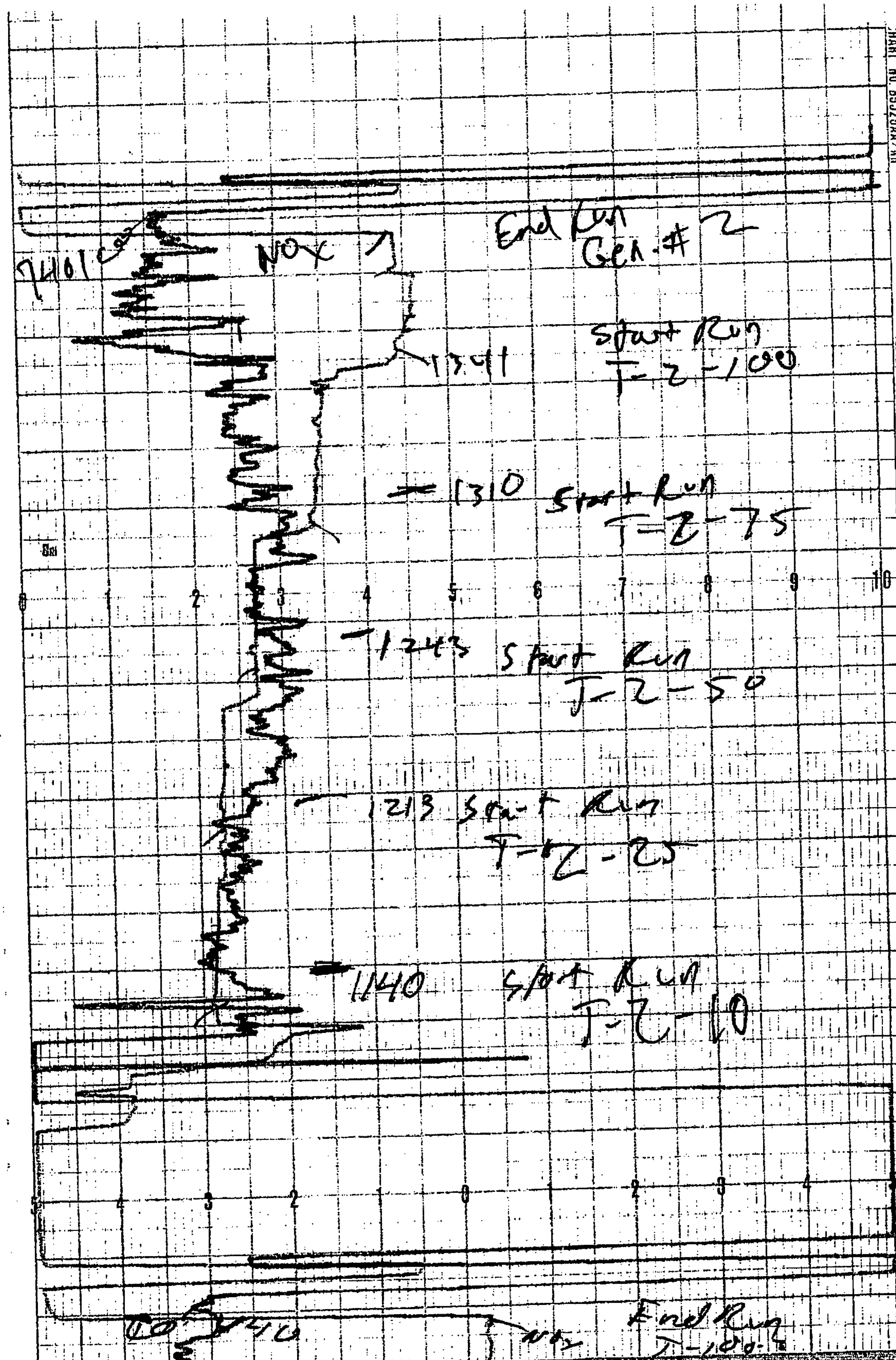

NOx 1050 End Run T-102
CO
1010
Start Run T-102
10 9 8 7 6 5 4 3 2 1 0
End Run T-101
NOx 917
CO
837
837
10m29cm
NOx 817 Run 1
10%
CO
0 1 2 3 4 5 6 7 8 9 10
System
NOx
6/11/07
CO

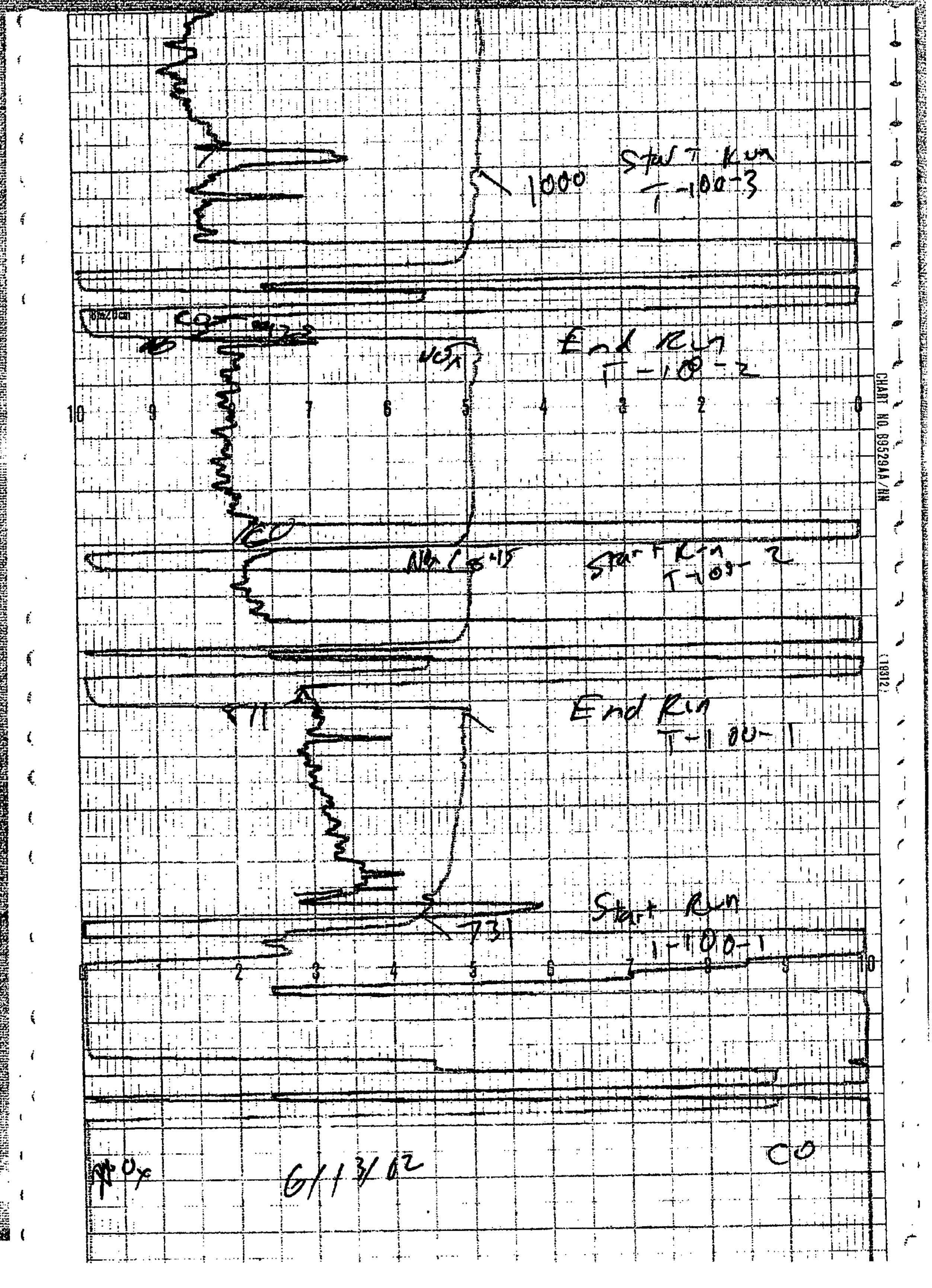


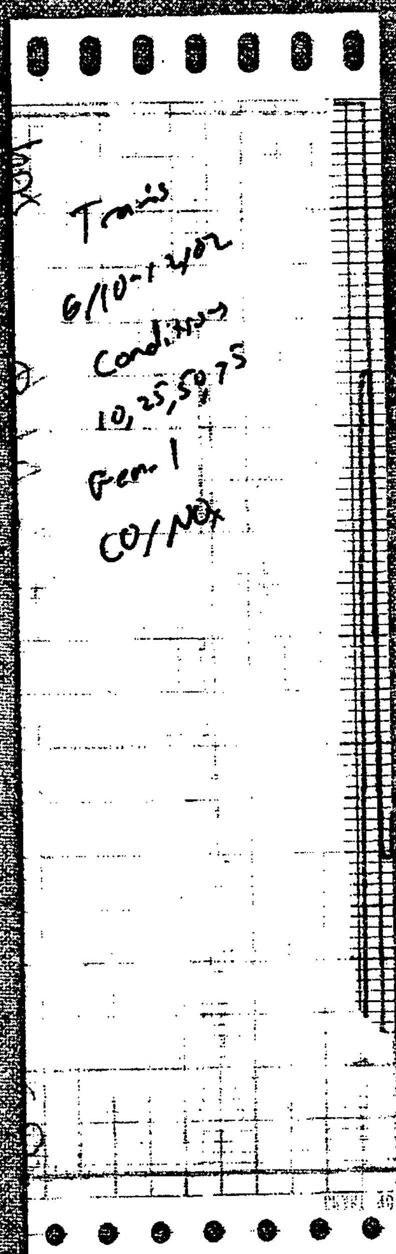
NOx 1500 End Run T-25-2
CO
1420 Start Run T-25-2
NOx End Run T-25-1
319 CO
1304 Start Run T-25-1
NOx 1215 End Run
CO
Start Run T-10-3 1135
CO
CHART NO. B9529AA NN


1005 Start Run T-50-3
0931 End Run CO T-50-2
0 1 2 3 4 5 6 7 8 9 10
851 Start Run T-50-2
End Run CO T-50-1
815
CO
733 Start Run T-50-1
6/12/02
5 4 3 2 1 0 1 2 3 4 5
6/12/02
CHART NO. B0520AA-NN
118312

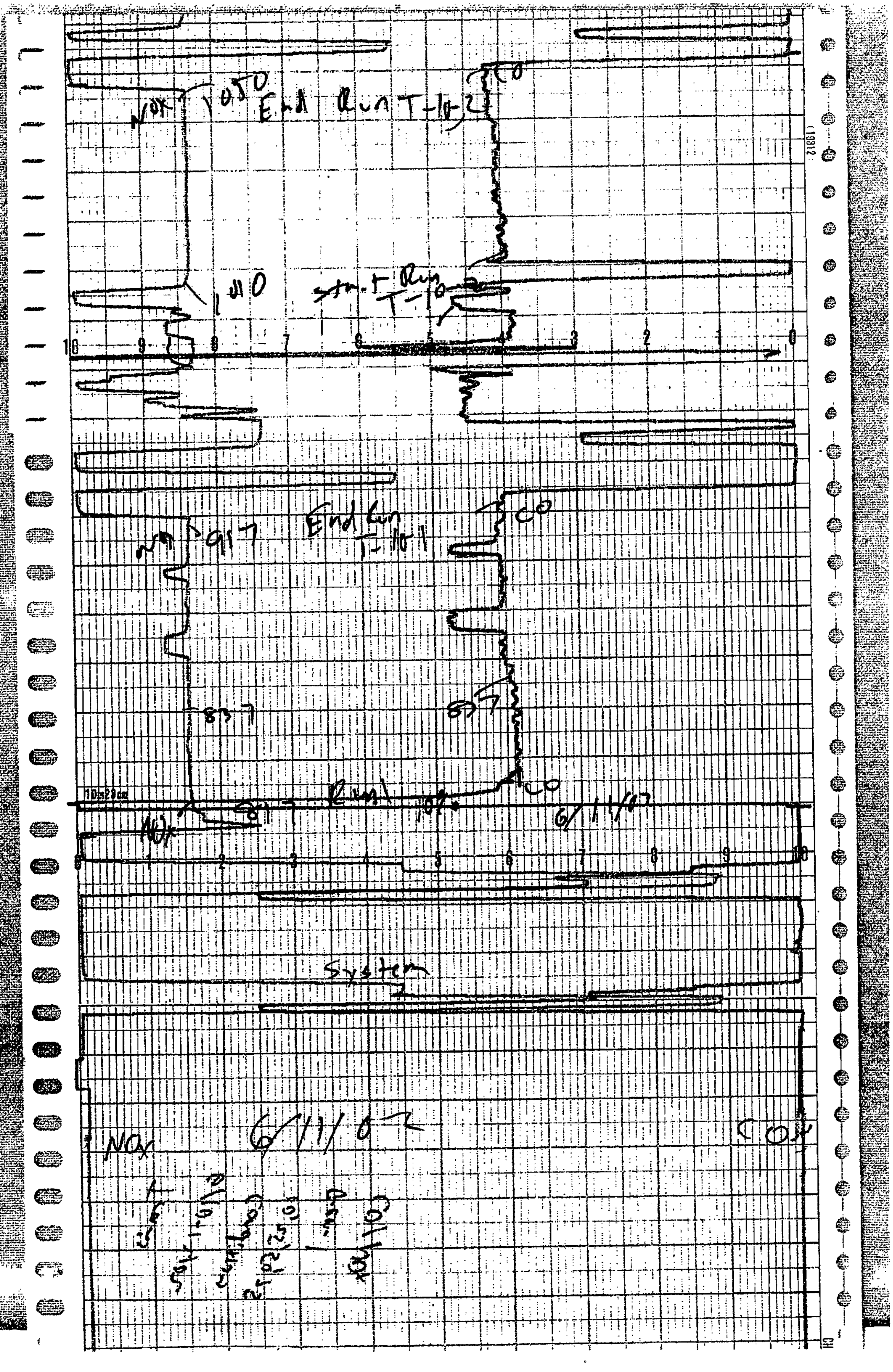

End Run T-75-3
NO 1421
CO
Start Run T-75-3
1337
End Run T-75-2
1318 NO
CO
Start T-75-2
1238
9m40cm
End Run T-75-1
NO 1200
CO
Start Run T-75-1
1124
CHART NO. B9529AA/NN

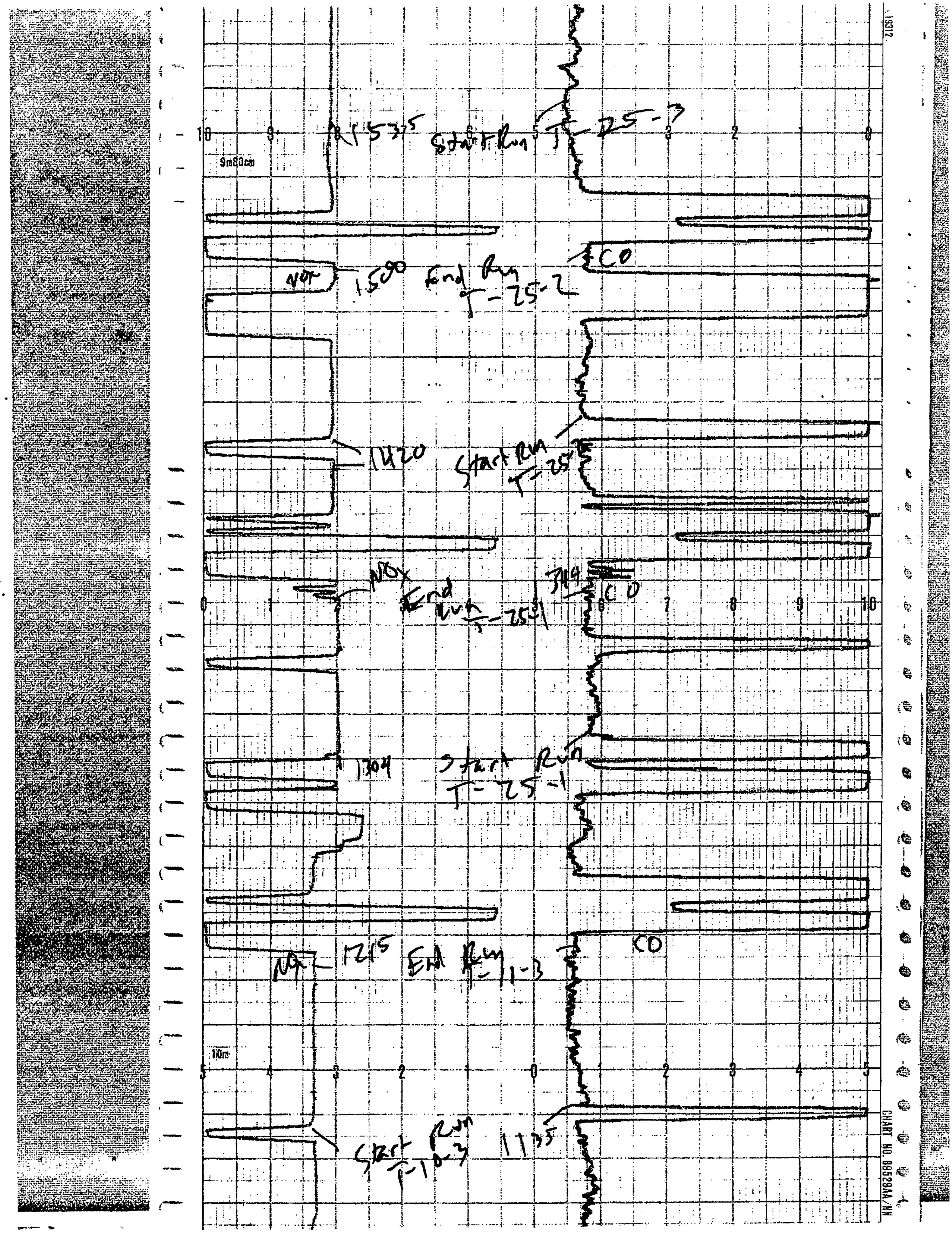

End Run
Gen #2
NOx
Start Run
T-2-100
1341
1310 Start Run
T-2-75
1243 Start Run
T-2-50
1213 Start Run
T-2-25
1140 Start Run
T-2-10
CO
NOx
End Run
T-100

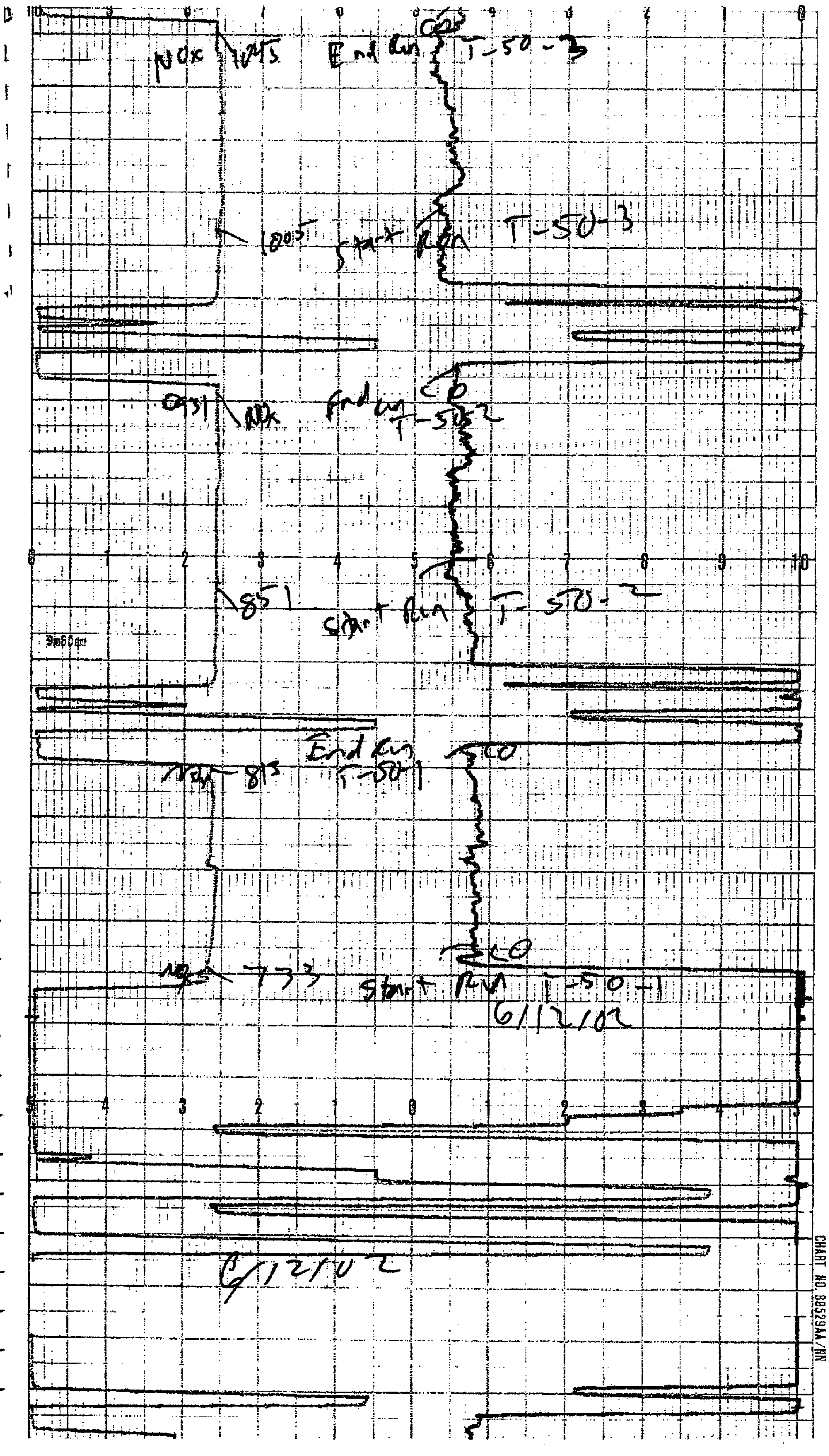

Start Run
T-100-3
1000
End Run
T-100-2
NO_x
CO
Start Run
T-100-2
End Run
T-100-1
Start Run
T-100-1
731
NO_x
6/13/02
CO
CHART NO. B9529AA/HN

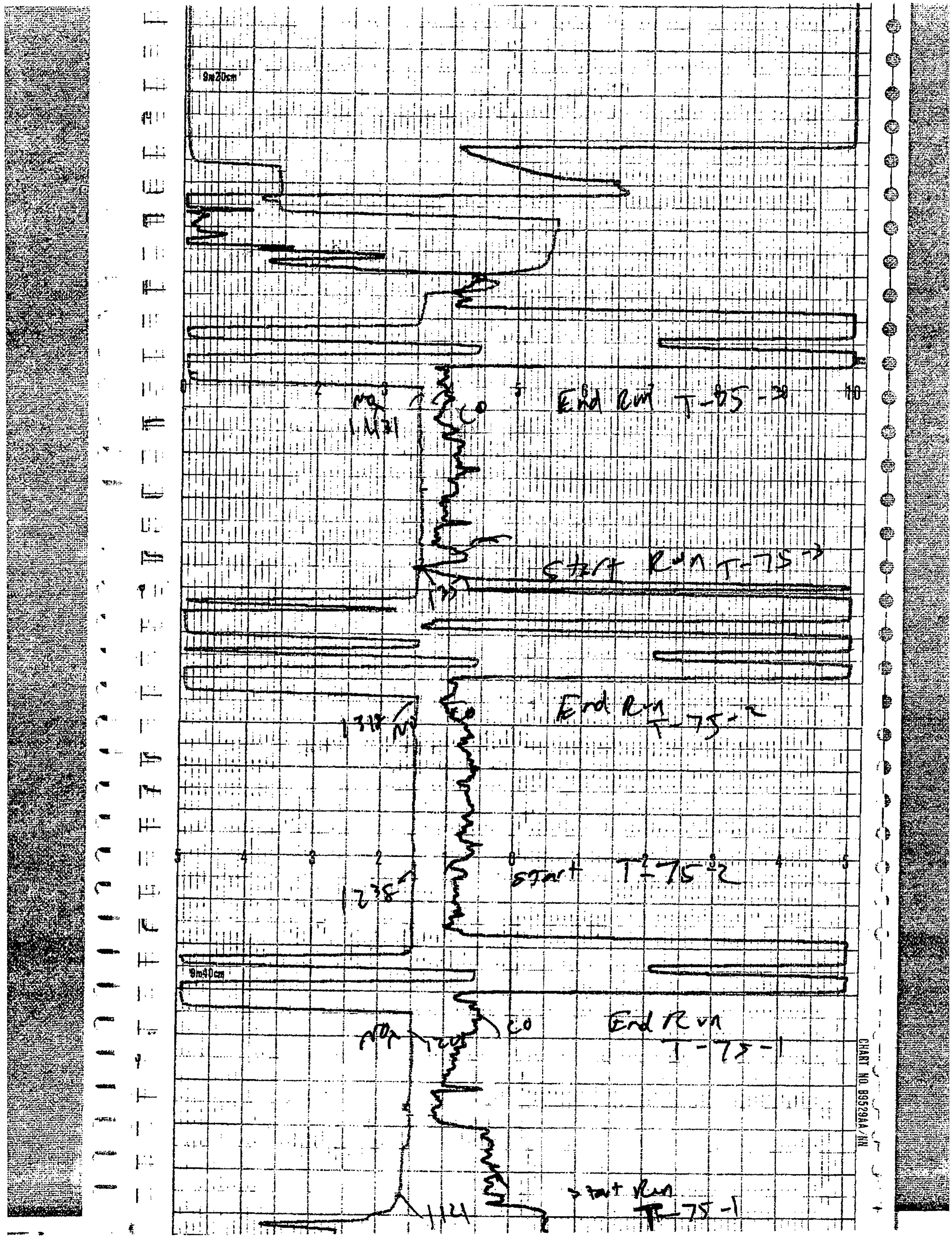


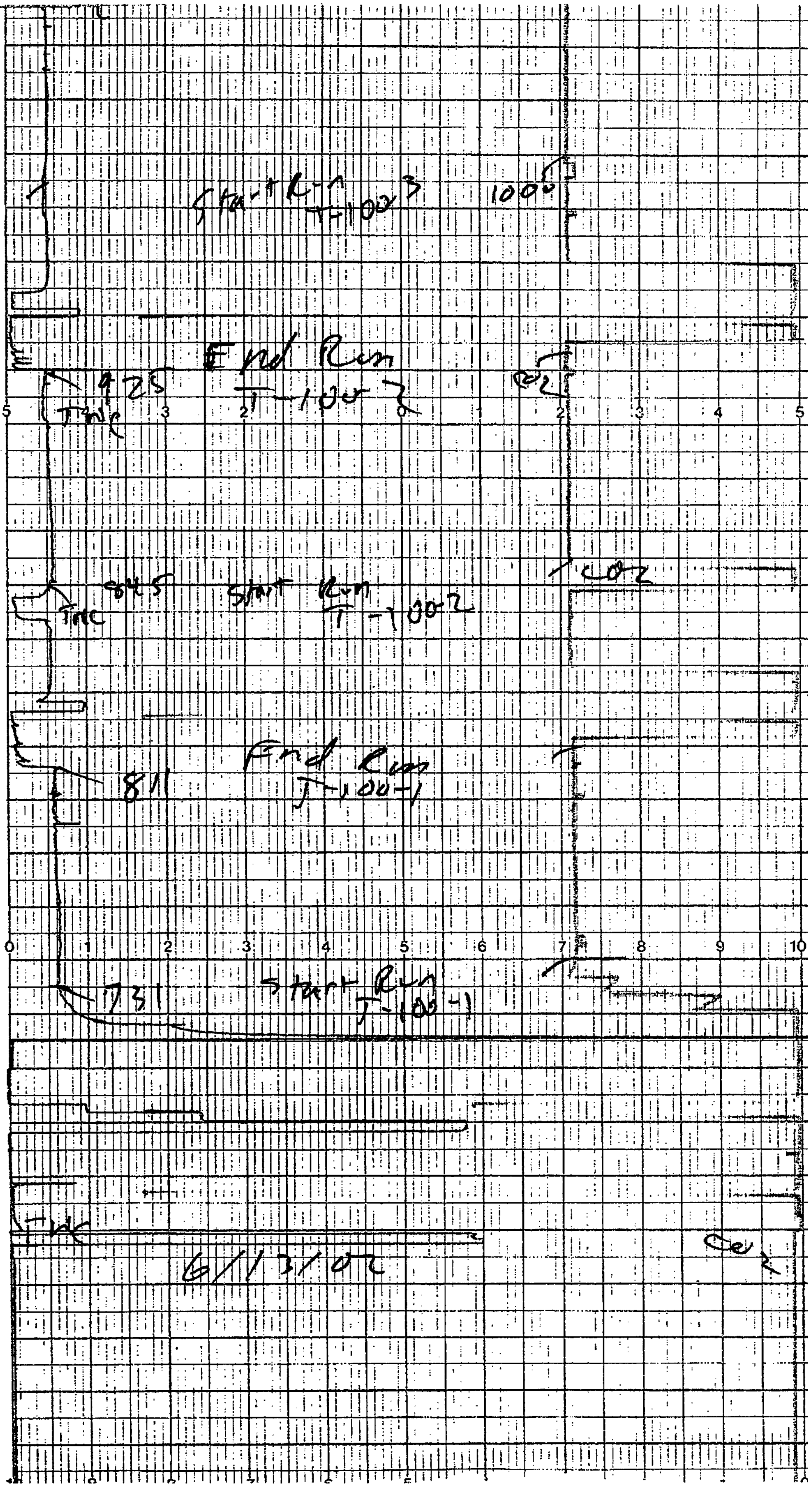
Trains
6/10-12/02
Conditions
10,25,50,75
Gen 1
CO/NOx


NOx 1050 End Run T-10-2
CO
1110
Start Run T-10
NOx 917 End Run T-10-1
CO
837
837
CO
Run 1 10%
NOx
6/11/07
System
NOx
6/11/07
COx

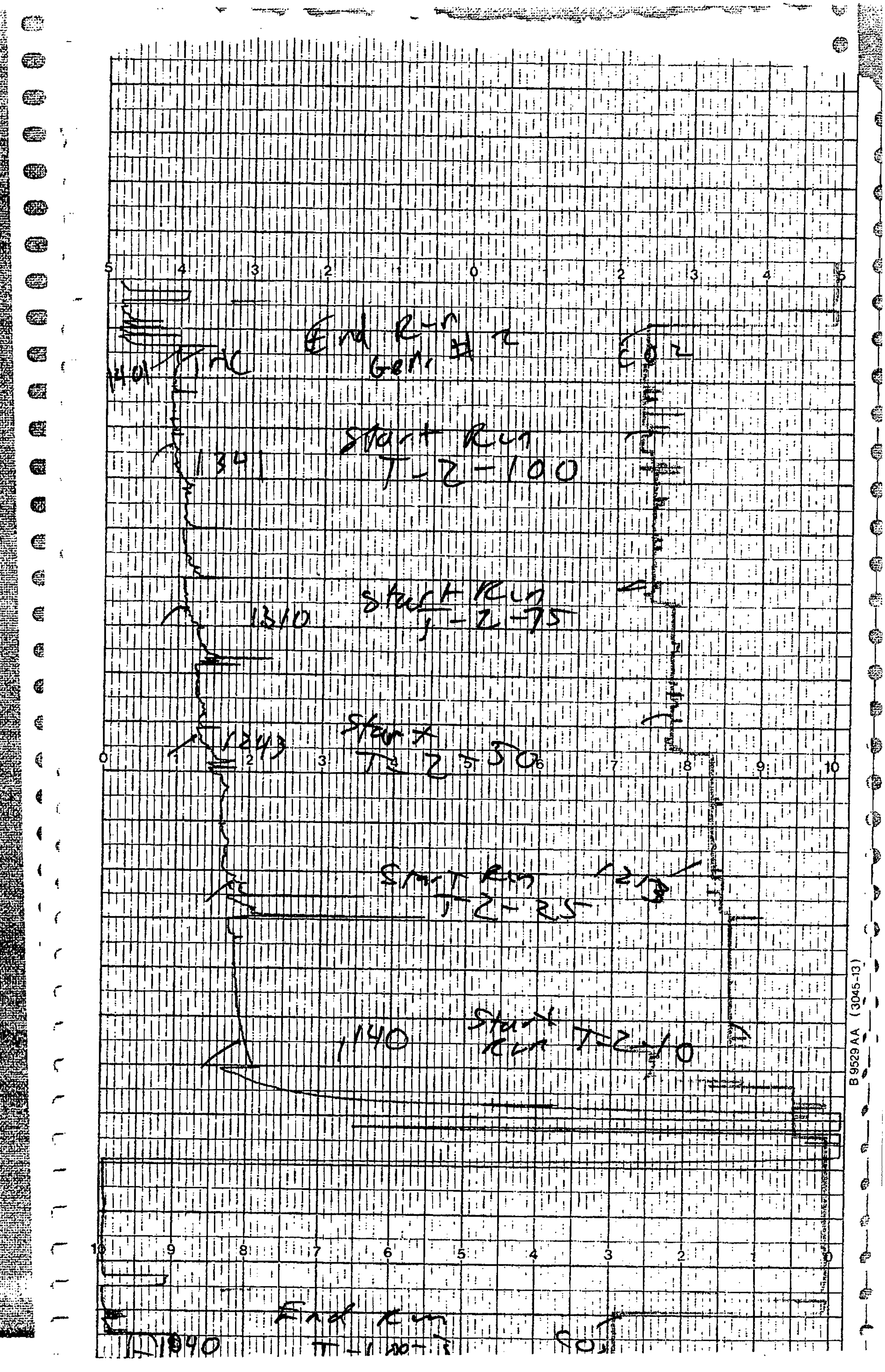

9m80cm
1535 Start Run T-25-3
CO
NOx 1500 End Run T-25-2
1420 Start Run T-25-2
NOx End Run T-25-1
CO
1304 Start Run T-25-1
1215 End Run
CO
10m
Start Run
1135
CHART NO. 89529AA/NN


NOx 1025 End Run T-50-3
CO
1005 Start Run T-50-3
0931 NOx End Run CO T-50-2
851 Start Run T-50-2
End Run CO
NOx 813 T-50-1
CO
NOx 733 Start Run T-50-1
6/12/02
6/12/02
CHART NO. 8B529AA/NN


9m20cm
End Run
Start Run T-75
End Run
T-75-2
start T-75-2
9m40cm
CO
End Run
T-75-1
start Run
T-75-1
CHART NO B9529AA/NN



B 9529 AA (3045-13)


End Run
Gen. #2
1401
TC
CO2
Start Run
T-2-100
1341
Start Run
T-2-75
1310
1243
Start
T-2-50
Start Run
T-2-25
1213
1140
Start Run T-2-10
End Run
1940
CO
B 9529 AA (3045-13)

ELMENDORF AFB

CLIENT -86 EMISSION MEASUREMENT PROGRAM

LOCATION ELMENDORF AFB

SUBJECT

EQ

PN ________ Sheet No. 1/3

Checked BY ________ Date ________

Computed By ________ Date ________

260 AMPS

Fuel ~ 7.4 lbs/gal

ENGINE ID # 4A231886 -86 ID# MG13

Initial 17053 START HRS.
17065.1 Hrs 6/25
10 hrs

JP-8 Fuel

	TIME	DATE	LOAD (%)	FUEL WT. (lbs)	FUEL TEMP (F)	AMPS	
	0730	6/25/02	10	118.2	73	26 AMPS	ΔFuel = 19.7 lbs.
Run 1	0755	6/25/02	10	109.35	109	26 AMPS	55 min.
	0805	6/25/02	10	105.35	112	26 AMPS	21.5 lbs/hr.
	0825	6/25/02	10	98.50	118	26	2.9 gal/hr. (1)
10%	0915	6/25/02	10	81.00	145	26	ΔFuel = 9.5 lbs.
	0940	6/25/02	10	71.50	158	26	25 min.
				46.7 lbs/2.167 hrs = 21.55 lbs/hr = 3.01 gal/hr			22.8 lbs/hr (2)
	ADD FUEL 0950	6/25/02	10	~~106.35~~ 106.85	121	26	~~3.08~~ 3.18 gal/hr.
	1005	6/25/02	10	102.2	125	26	ΔFuel = 26.6 lbs.
	1020	6/25/02	10	96.0	141	26 AMPS	80 min.
	1050	6/25/02	10	87.0	148	26	19.95 lbs/hr. (3)
	1110	6/25/02	10	80.25	156	26	2.7 gal/hr.
25%	ADD FUEL 1125	6/25/02	25	109.85	128	67 AMPS	
	1150	6/25/02	25	98.96	141	67 AMPS	ΔFuel 29.1 lbs. 65 min.
	1220	6/25/02	25	87.25	152	67	26.86 lbs/hr (1)
	1230	6/25/02	25	80.75	152	67	~~3.6~~ 3.75 gal/hr.
25%	ADD FUEL 1305	6/26/02	25	106.65	128	67	ΔFuel 24.25
	1340	6/25/02	25	90.20	147	67	55 min.
	1400	6/25/02	25	82.40	151	67	26.45 lbs/hr. (2) 3.69 gal/hr.
	1405	6/25/02	25	79.25	158	67	
	1430	6/25/02	25	69.85	156	67	
	ADD FUEL 1435	6/25/02	25	107.15	127	67	ΔFuel = 13.25 lbs. 30 min.
	1505	6/25/02	25	93.90	134	67	26.5 lbs/hr. (3) 3.69 gal/hr

CLIENT
LOCATION
SUBJECT

EQ

PN
Checked BY ______ Date
Computed By ______ Date

Sheet No. 2/3

	TIME	DATE	LOAD (%)	FUEL WT. (lbs.)	FUEL TEMP. (F)	AMPS	
50% 1520 —	1515	6/25/02	50	86.10	153	130	ΔFUEL = 22.9 lbs
	1550	6/25/02	50	63.20	161	130	35min. 39.3 lbs/hr.
	ADD FUEL						5.3 GAL/hr 5.48
①	1555	6/25/02	50	99.00 ~~98.50~~	121	130	ΔFUEL: 33.25 lbs.
	1615	6/25/02	50	87.40	145	130	50min. 39.9 lbs/hr.
1620 —	1630	6/25/02	50	77.70	153	130	(1) 5.4 gal/hr.
1645 —	1645	6/25/02	50	65.75	158	130	5.56 gal/hr
②	ADD FUEL 1650	6/25/02	50	98.15	128	130	ΔFUEL = 46.7 lbs.
	1725	6/25/02	50	76.40	155	130	70min. 40.02 ~~28.02~~ lbs/hr.
1745	1740	6/25/02	50	66.90	157	130	~~3.8~~ GAL/hr. 5.4 (2)
1800 —	1800	6/25/02	50	51.45	168	130	5.58
	ADD FUEL						
	1815	6/25/02	50	81.45	128	130	ΔFUEL 25.75 lbs
③	1840	6/25/02	50	66.55	157	130	325 44.14 lbs/hr. (3)
1850 —	1850	6/25/02	50	55.70	161	130	5.97 GAL/hr. 6.16
75%	1040	6/26/02	75	99.00	100 ~~200~~	200	ΔFUEL = 45.35 lbs.
1035-1135	1105	6/26/02	75	79.20	136	200	55min.
	1120	6/26/02	75	65.05	146	200	49.47 lbs/hr.
	1135	6/26/02	75	53.65	152	200	6.68 GAL/hr. 6.90
	ADD FUEL						
100%	1020	6/27/02	100	99.20	101	245	ΔFUEL = 24.9 lbs. 30min. 49.8 lbs/hr. 6.7 GAL/hr. 6.95
1020-1120 [illegible]	1050	6/27/02	100	74.30	134	245	Added fuel ← 107.7 at 1055 —
	ADD FUEL						
	1105	6/27/02	100	99.65	123	245	Fuel temp at 113°F
	1120	6/27/02	100	85.95	135	245	ΔFUEL = 41.25 lbs. 50min.
	1145	6/27/02	100	66.45	149	245	49.5 lbs/hr. 6.7 GAL/hr. 6.90

CLIENT ______ PN ______ Sheet No. 3/3

LOCATION ______ Checked BY ______ Date ______

SUBJECT ______ Computed By ______ Date ______

EQ

	TIME	DATE	LOAD (%)	FUEL WT. (lbs.)	FUEL TEMP. (F)	AMPS	
100%	ADD FUEL						
94%	1150	6/27/02	100	~~56.4~~ 102.05	120	245	(94%)
	1205	6/27/02	100	90.15	134	245	
1205 - 1305	1220	6/27/02	100	79.30	152	245	ΔFuel: 53.35 lbs. 65 min.
	1235	6/27/02	100	66.45	154	245	49.25 lbs/hr.
	1255	6/27/02	100	48.70	160	245	6.65 GAL/hr. 6.87
	ADD FUEL						
100%	1300	6/27/02	100	84.20	122	245	ΔFuel = 38 lbs.
	1310	6/27/02	100	71.55	141	245	45 min.
1325 - 1425	1335	6/27/02	100	54.90	158	245	50.7 lbs/hr.
	1345	6/27/02	100	46.20	163	245	6.85 7.07
	ADD FUEL						
	1350	6/27/02	100	118.35	121	245	
	GENERATOR DOWN						
	1430	6/27/02	100	109.85	130	245	ΔFuel = 28.2 lbs. 35 min.
	1505	6/27/02	100	81.65	158	245	48.34 lbs/hr. 6.53 GAL/hr.
75%							6.74
	1515	6/27/02	75	71.80	161	200	ΔFuel: 35.2 lbs.
1523	1555	6/27/02	75	36.60	163	200	40 min. 52.8 lbs/hr.
	ADD FUEL						7.1 GAL/hr. 7.36
1623	1600	6/27/02	75	70.65	FG 142	200	ΔFuel = 29.9 lbs. 35 min.
	1635	6/27/02	75	40.75	156	200	51.3 lbs/hr.
1642	ADD FUEL						6.9 GAL/hr. 7.15
	1710	6/27/02	75	86.95	121	200	ΔFuel = 37.35 lbs.
	1730	6/27/02	75	69.20	152	200	45 min
	1740	6/27/02	75	59.15	158	200	49.8 lbs/hr
1753	1755	6/27/02	75	49.60	161	200	6.736 GAL/hr. 6.95

Environmental Quality Management, Inc.

MG-13 Generator (A)

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Elmendorf AFB Date: 6/24/02
Sampling Location: Generator Outlet Clock Time:
Run #: Prelims Operators: RK / TG
Barometric Pressure, in.Hg: 29.95 Static Pressure, in.H_2O:
Moisture, %: 4 Molecular wt., Dry: Pitot Tube, Cp: 0.99
Stack Dimension, in. Diameter or Side 1: 3" Side 2:
Wet Bulb, °F: Dry Bulb, °F:
Pitot # Thermocouple #

S.le = 8P
$\sqrt{\Delta P}$ = 2.369
Ts = 613
Vs = 224.3
acfm = 660.7
dscfm = 311.6

	Traverse Point Number	Velocity Head in.H_2O	Stack Temp,°F
@ 1510	1	5.6	598
10% Load	2	5.5	600
	3	5.4	612
	1	5.7	618
	2	5.7	620
	3	5.8	627
1520	1	6.4	685
25% Load	2	6.3	685
	3	6.4	685
	1	6.0	693
	2	6.1	695
	3	6.3	696
1525	1	7.8	755
100% Load	2	8.1	759
	3	7.9	762
	1	8.3	764
	2	8.2	767
	3	8.0	766
		$\overline{\sqrt{\Delta P}}$ =	$\overline{Ts}$ =

$$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 \times \% N_2)$$

$$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$$

Md =

$$Ms = Md \times \left(1 - \frac{\% H_2O}{100}\right) + 18\left(\frac{\% H_2O}{100}\right)$$

10% Load

static = -1.3"

$$Ms = (\quad) \times \left(1 - \frac{}{100}\right) + 18\left(\frac{}{100}\right)$$

Ms =

$\overline{Ts}$ = °F = °R(°F + 460)

$$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{}{13.6}$$

25% Load

Ps = in. Hg

static = -1.8"

$\overline{\sqrt{\Delta P}}$ =

$$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$$

$$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$$

-1.8"

Vs = ft^2

50% Load

As = ft^2

static =

Qs = Vs × As × 60 s/m

Qs = × × 60

Qs = acfm

Qs = dscfm

Environmental Quality Management, Inc.

MG-13 Generator (A)

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Elmendorf AFB Date: 6/24/02

Sampling Location: Generator Outlet Clock Time: ____

Run #: Prelim Operators: AK/TG

Barometric Pressure, in.Hg: 29.95 Static Pressure, in.H_2O: ____

Moisture, %: 4 Molecular wt., Dry: ____ Pitot Tube, Cp: 0.99

Stack Dimension, in. Diameter or Side 1: 3" Side 2: ____

Wet Bulb, °F: ____ Dry Bulb, °F: ____

Pitot # ____ Thermocouple # ____

	Traverse Point Number	Velocity Head in.H_2O	Stack Temp, °F
@ 1330	1	6.8	711
	2	6.6	717
75% Load	3	6.8	720
	1	6.6	700
	2	6.7	706
	3	6.8	720
@ 1340	1	5.4	650
	2	5.7	655
50 ~~100~~%	3	5.8	660
Load	1	5.0	616
	2	5.7	655
	3	6.0	661
		$\overline{\sqrt{\Delta P}}$ =	$\overline{Ts}$ =

$$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 \times \% N_2)$$

$$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$$

Md =

Static = -1.5"

$$Ms = Md \times \left(1 - \frac{\% H_2O}{100}\right) + 18\left(\frac{\% H_2O}{100}\right)$$

$$Ms = (\quad) \times \left(1 - \frac{\quad}{100}\right) + 18\left(\frac{\quad}{100}\right)$$

Ms =

$$\overline{Ts} = \quad °F = \quad °R(°F + 460)$$

$$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{\quad}{13.6}$$

Ps = in. Hg

Static = -1.3"

$$\overline{\sqrt{\Delta P}} =$$

$$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$$

$$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$$

$Vs =$ ft^2

$As =$ ft^2

Qs = Vs × As × 60 s/m

Qs = × ×60

Qs = acfm

Qs = dscfm

Environmental Quality Management, Inc.

4" = 0.087 ft²

103.64 = Vs
91.43

1.28 = ΔP

10% Load

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Elmendorf Air Force Base Date: 6/25/02
Sampling Location: Generator Outlet Clock Time:
Run #: 1, 2, 3 Operators:
Barometric Pressure, in.Hg: 29.90 Static Pressure, in.H_2O:
Moisture, %: 4 Molecular wt., Dry: Pitot Tube, Cp: 0.99
Stack Dimension, in. Diameter or Side 1: 3" Side 2: —
Wet Bulb, °F: Dry Bulb, °F: Ms = 28.71
Pitot # Thermocouple #. Ps = 29.84 ΔP = 4.49
Vs = 189.0 $\sqrt{\Delta P}$ = 2.12 Ts = 442

	Traverse Point Number	Velocity Head in.H_2O	Stack Temp, °F
@ 0818	1	4.3	443
	2	4.5	443
	3	4.5	442
	1	4.6	443
	2	4.6	444
	3	4.4	444
@ 0936			
	1	4.2	456
	2	4.5	456
	3	4.5	444
	1	4.5	456
	2	4.6	456
	3	4.5	455
@ @ 1050			
	1	4.2	453
	2	4.3	456
	3	4.3	458
	1	4.1	460
	2	4.0	459
	3	3.9	456
		$\overline{\sqrt{\Delta P}}$ =	$\overline{Ts}$ =

$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 \times \% N_2)$

541 acfm
303 dscfm

$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$

Static = − 0.85"

Md =

$Ms = Md \times \left(1 - \frac{\% H_2O}{100}\right) + 18\left(\frac{\% H_2O}{100}\right)$

$Ms = (\quad) \times \left(1 - \frac{}{100}\right) + 18\left(\frac{}{100}\right)$

Ms =

$\overline{Ts}$ = °F = °R (°F + 460)

$\sqrt{\Delta P}$ = 4.467
ΔP = 2.11
Ts = 454 °F

$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{}{13.6}$

Static = − 0.85

Ps = in. Hg

$\overline{\sqrt{\Delta P}}$ =

$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$

$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$

Vs = ft^2

As = ft^2

Static = − 0.80"

Qs = Vs × As × 60 s/m

Qs = × × 60

Qs = acfm

Qs = dscfm

FIELD DATA SHEET

10% load K= 2.243

Plant: Elmendorf AFB Sample Type: M5/202 Operator: AWB
Sampling Location: Generator Exaust Pbar: 29.90 Ps: -0.85
Run Number: E-10-5-1 Date: 6-25-02 CO_2: 3.2 O_2: 17/16.5
Pretest Leak Rate: 0.003 cfm @ 11 in.Hg. Probe Length/Type: 2' Glass Pitot#: ____
Pretest Leak Check: Pitot: ✓ Orsat: — Stack Diameter: 4" As: ____

Nozzle ID: .201 Thermocouple #: ____
Assumed Bws: 4 Filter #: 830228
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: 0.001 cfm @ 3 in.Hg.
Post-Test Leak Check: Pitot: ~ Orsat: —

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH		Stack Temp (Ts)	Temperature °F		Impinger Temp. °F	Dry Gas Meter Temp. Tm		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter		Inlet	Outlet	
	0	0730	83.647										
	5	0735	88.4	1.81	2.1	2.1	430	253	254	62	65	65	1
	10	0740	92.0	1.81	2.37	2.3	430	254	248	60	65	65	1
	15	0745	96.9	1.81	2.38	2.4	437	253	254	58	67	65	1
	20	0750	100.7	1.81	2.38	2.4	438	252	254	52	70	65	1
	25	0755	105.2	1.81	2.39	2.4	439	254	253	54	73	66	2
	30	0800	109.4	1.81	2.39	2.4	440	254	252	59	75	66	2
	35	0805	113.9	1.81	2.39	2.4	442	253	254	63	76	67	2
	40	0810	118.3	1.81	2.39	2.4	443	254	252	68	78	68	2
	45	0815	122.9	1.81	2.40	2.4	442	253	253	65	79	69	2
	50	0820	127.1	1.81	2.4	2.4	442	253	251	63	80	69	2
	55	0825	132.0	1.81	2.4	2.4	442	252	252	60	81	70	2
	60	0830	135.843	1.81	2.4	2.4	444	251	253	57	82	72	2

ΔVm = 52.196 ✓ $\sqrt{\Delta p}$ = 1.345 ✓ $\overline{\Delta H}$ = 2.37 ✓ $\overline{Ts}$ = 440 ✓ $\overline{Tm}$ = 71 ✓

Δp = 1.81 ✓ Moisture = 3.8 % ✓ VS = 116 acfm = 610.5

dscfm = 343.9

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elmendorf
Run No. E-10-5-1
Date 6/25/02 Sample Box No. SB-5
Job No. 30174003.002
Sample Location Gen. 1 - 10%
Filter No. 830228
Train Preparer D. Allen
Sample Recovery Person D. Allen
Comments

Front Half
Acetone Container No. ______ Liquid Level Marked ______ Sealed ______

Filter
Container No. ______ Sealed ______

Description of Filter ______

Samples Stored and Locked ______

Back Half/Moisture
Container No. ______

Liquid Level Marked ______ Sealed ______

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	DI H_2O	100	725.0	725.5	0.5 ✓
2	"	"	738.2	760.4	22.2 ✓
3	—	—	630.2	638.0	7.8 ✓
4	SG	250	~~831.2~~ 834.1	847.1	13.0 ✓
5					
6					
Total					43.5 ✓

Description of Impinger Catch: 1st Imp. Yellow

N:\Forms\Forms\Emission Testing\Sample Recovery Data.dcc

FIELD DATA SHEET 10% load K= 2.246

Plant: Elmendorf AFB Sample Type: M5/202 Operator: AG
Sampling Location: Generator Exaust Pbar: 29.90 Ps: -0.85
Run Number: E-10-5-2 Date: 6-25-02 CO_2: 3.2 O_2: TR/16.4
Pretest Leak Rate: .002 cfm @ 15 in.Hg. Probe Length/Type: 2' Glass Pitot#: ____
Pretest Leak Check: Pitot: N/A Orsat: N/A Stack Diameter: 4" As: ____

Nozzle ID: .201 Thermocouple #: 2-7
Assumed Bws: 4 Filter #: PC014
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: .002 cfm @ 7 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
0	0	0845	136.055										
1	5	0850	139.7	1.28	1.69	1.69	445	243	251	52	73	72	2
2	10	0855	143.3	1.28	1.69	1.7	446	252	255	46	76	72	2
3	15	0900	146.9	1.28	1.7	1.7	447	252	254	47	78	73	3
4	20	0905	150.5	1.28	1.7	1.7	447	253	252	47	79	73	4
5	25	0910	154.3	1.28	1.7	1.7	447	251	251	49	81	73	4
6	30	0915	158.1	1.28	1.7	1.7	448	252	253	47	82	74	4
7	35	0920	161.6	1.28	1.7	1.7	448	252	254	51	82	74	4
8	40	0925	165.5	1.28	1.7	1.7	452	252	249	50	83	75	4
9	45	0930	169.5	1.28	1.7	1.7	453	251	254	50	83	75	4
10	50	0935	172.6	1.28	1.7	1.7	454	252	252	51	83	75	4
11	55	0940	176.3	1.28	1.7	1.7	455	252	252	51	84	76	5
12	60	0945	179.895	1.28	1.7	1.7	453	252	252	51	84	76	6

ΔVm = 43.840 ✓ $\sqrt{\Delta p}$ = 1.131 ✓ $\overline{\Delta H}$ = 1.7 ✓ $\overline{Ts}$ = 450 ✓ Vs = 98.60 $\overline{Tm}$ = 77 ✓

Δp = 1.28 Moisture = 3.7 acfm = 516.3

dscfm = 287.7

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elmendorf Run No. E-10-5-2

Date 6/25/12 Sample Box No. SB-3 Job No. 30174.0003.002

Sample Location Gen.l Exhaust Filter No. QC014

Train Preparer A. F. / RK

Sample Recovery Person DA

Comments

Front Half

Acetone Container No. ______ Liquid Level Marked ______ Sealed ______

Filter Container No. ______ Sealed ______

Description of Filter ______

Samples Stored and Locked ______

Back Half/Moisture

Container No. ______

Liquid Level Marked ______ Sealed ______

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H2O	100	715.5	728.6	13.1
2	DI H2O	100	716.4	~~623.0~~ 729.8	13.4
3	Empty	Empty	622.0	625.4	3.4
4	Silica Gel	250	896.9	902.8	5.9
5					
6					
Total			Imp. 2	729.8	35.8

Description of Impinger Catch: 1st Imp. Cloudy

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FIELD DATA SHEET

10% load

Plant: Elmendorf AFB
Sampling Location: Generator Exaust
Run Number: E-10-53 Date: 6-25-02
Pretest Leak Rate: .006 cfm @ 9 in.Hg.
Pretest Leak Check: Pitot: N/A Orsat: N/A

Sample Type: m5/202 Operator: AG
Pbar: 29.90 Ps: -0.85"
CO_2: 3.2 O_2: 16.4
Probe Length/Type: 2' glass Pitot#:
Stack Diameter: 4" As:

Nozzle ID: .201 Thermocouple #:
Assumed Bws: 4 Filter #: 830225
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: .004 cfm @ 3 in.Hg.
Post-Test Leak Check: Pitot: Orsat:

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1005	180.261										
	5	1010	184.31	1.28	1.69	1.7	449	253	255	58	76	76	1
	10	1015	187.52	1.28	1.69	1.7	450	252	255	53	77	76	1
	15	1020	191.21	1.28	1.69	1.7	450	253	252	50	79	76	2
	20	1025	195.02	1.28	1.69	1.7	451	254	257	52	81	76	2
	25	1030	198.91	1.28	1.70	1.7	452	254	253	53	83	76	2
	30	1035	202.48	1.28	1.70	1.7	454	255	253	52	85	76	2
	35	1040	206.11	1.28	1.70	1.7	453	254	255	53	84	76	2
	40	1045	209.85	1.28	1.70	1.7	454	254	251	53	84	77	2
	45	1050	213.81	1.28	1.70	1.7	454	254	253	53	85	77	2
	50	1055	217.31	1.28	1.70	1.7	454	253	251	53	85	77	3
	55	1100	220.91	1.28	1.70	1.7	453	254	253	53	85	77	3
	60	1105	224.713	1.28	1.69	1.7	458	253	253	54	85	78	3

ΔVm = 44.452 $\sqrt{\Delta p}$ = 1.1314 $\overline{\Delta H}$ = 1.7 $\overline{Ts}$ = 453 $\overline{Tm}$ = 79

Bws = 3.8 acfm 517.2 dscfm 286.9 Iso 100.6

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elmendorf Run No. E-10-5-3
Date 6/25/02 Sample Box No. SB-2 Job No. 30174.003.002
Sample Location Gen. 1 exhaust - 10% Filter No. 830225
Train Preparer AG.
Sample Recovery Person DA
Comments

Front Half
Acetone Container No. Liquid Level Marked Sealed

Filter
Container No. Sealed

Description of Filter

Samples Stored and Locked

Back Half/Moisture
Container No.

Liquid Level Marked Sealed

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H2O	100	712.8	726.9	14.1 ✓
2	DI H2O	100	732.4	745.4	13.0 ✓
3	Empty	Empty	634.0	637.6	3.6 ✓
4	Silica Gel	250	923.3	929.7	6.4 ✓
5					
6					
Total					37.1 ✓

Description of Impinger Catch: 1st Imp Cloudy

DA

Environmental Quality Management, Inc. 25% Load

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Elmendorf Air Force Base Date: 6/25/02
Sampling Location: Generator Outlet Clock Time:
Run #: 25% Load Operators: [illegible]/TG
Barometric Pressure, in.Hg: 29.90 Static Pressure, in.H_2O:
Moisture, %: Molecular wt., Dry: Pitot Tube, Cp: 0.99
Stack Dimension, in. Diameter or Side 1: 3" Side 2:
Wet Bulb, °F: Dry Bulb, °F: Ps = 29.83 $\sqrt{\Delta P}$ = 2.191
Pitot # Thermocouple # Md = 29.24 Ms = 28.68 ΔP = 4.8 Ts = 552 °F

Vs = 201.6
acfm = 594
dscfm = 293.5
Static = -1.00"

Traverse Point Number	Velocity Head in.H_2O	Stack Temp, °F
1	4.7	545
2	4.9	553
3	4.5	552
1	4.9	553
2	4.9	554
3	4.9	553
1	4.6	551
2	4.8	552
3	5.1	551
1	4.7	551
2	4.9	553
3	4.7	551
1	4.7	558
2	4.8	556
3	4.8	551
1	4.7	553
2	4.6	550
3	4.8	550
	$\overline{\sqrt{\Delta P}}$ =	$\overline{Ts}$ =

@
@
1340
@

$$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 \times \% N_2)$$

$$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$$

Md =

$$Ms = Md \times \left(1 - \frac{\% H_2O}{100}\right) + 18\left(\frac{\% H_2O}{100}\right)$$

$$Ms = (\quad) \times \left(1 - \frac{\quad}{100}\right) + 18\left(\frac{\quad}{100}\right)$$

Ms =

$\overline{Ts}$ = °F = °R(°F + 460)

$$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{\quad}{13.6}$$

Ps = in. Hg static = -1.1"

$\overline{\sqrt{\Delta P}}$ =

$$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$$

$$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$$

Vs = ft^2

As = ft^2 static = -2.00"

Qs = Vs × As × 60 s/m

Qs = × × 60

Qs = acfm

Qs = dscfm

FIELD DATA SHEET

25% load

Plant: Elmendorf AFB Sample Type: M5/202 Operator: AWG
Sampling Location: Generator Exaust Pbar: 29.90 Ps: ____
Run Number: E-25-5-1 Date: 6-25-02 CO_2: 4 O_2: 15
Pretest Leak Rate: .004 cfm @ 9 in.Hg. Probe Length/Type: 2' Glass Pitot#: ____
Pretest Leak Check: Pitot: N/A Orsat: N/A Stack Diameter: 4" As: ____

Nozzle ID: .201 Thermocouple #: ____
Assumed Bws: 5 Filter #: 830226
Meter Box #: 9 Y: 1.006 ΔH@: 1.775
Post-Test Leak Rate: 0.002 cfm @ 6 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1125	224.922										
	5	1130	229.02	1.81	2.16	2.1	548	250	253	60	78	77	1
	10	1135	233.37	1.81	2.17	2.2	547	253	254	54	79	77	1
	15	1140	237.41	1.81	2.17	2.2	548	254	263	53	81	77	2
	20	1145	241.81	1.81	2.17	2.2	548	253	256	55	83	77	2
	25	1150	246.0	1.81	2.17	2.2	548	253	255	56	84	77	2
	30	1155	250.49	1.81	2.2	2.2	550	252	253	58	85	77	2
	35	1200	254.65	1.81	2.18	2.2	550	263	255	58	86	78	3
	40	1205	258.78	1.81	2.18	2.2	580	254	254	59	86	78	3
	45	1210	263.1	1.81	2.18	2.2	550	254	252	59	86	78	3
	50	1215	266.5	1.81	2.18	2.2	552	253	252	60	87	79	3
	55	1220	271.1	1.8	2.18	2.2	553	252	251	61	87	79	3
	60	1225	275.098	1.8	2.2	2.2	553	251	251	62	88	79	3

ΔVm = 50.176 ✓ $\overline{\sqrt{\Delta p}}$ = 1.345 ✓ $\overline{\Delta H}$ = 2.2 ✓ $\overline{Ts}$ = 550 ✓ Moisture = 5.3% $\overline{Tm}$ = 81 ✓

Vs = 123.8 acfm = 648.2 dscfm = 320.0

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elmendorf Run No. E-25-5-1
Date 6/25/02 Sample Box No. SB-1 Job No. 30174.0003-002
Sample Location Gen. 1 - Exhaust - 25% Filter No. 850226
Train Preparer D Allen
Sample Recovery Person DA
Comments ______

Front Half
Acetone Container No. ______ Liquid Level Marked ______ Sealed ______

Filter
Container No. ______ Sealed ______

Description of Filter ______

Samples Stored and Locked ______

Back Half/Moisture
Container No. ______

Liquid Level Marked ______ Sealed ______

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H2O	100	726.4	748.1	21.7 ✓
2	DI H2O	100	725.1	740.0	15.9 ✓
3	Empty	Empty	623.0	627.1	4.1 ✓
4	Siliza Gel	280	~~83.41~~	848.2	17.0 ✓
5			831.2		
6					
Total					58.7 ✓

Description of Impinger Catch: 1st Imp - Cloudy

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FIELD DATA SHEET

25% load

Plant: Elmendorf AFB Sample Type: M5/202 Operator: AG.
Sampling Location: Generator Exaust Pbar: 29.90 Ps: -1.1
Run Number: E-25-5-2 Date: 6-25-02 CO_2: 4 O_2: 15
Pretest Leak Rate: .006 cfm @ 10 in.Hg. Probe Length/Type: 2' Glass Pitot#: N/A
Pretest Leak Check: Pitot: N/A Orsat: N/A Stack Diameter: 4" As:

Nozzle ID: 201 Thermocouple #:
Assumed Bws: 4 Filter #: PC024
Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: .006 cfm @ 8 in.Hg.
Post-Test Leak Check: Pitot: N/A Orsat: N/A

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1245	275.250										
	5	1250	279.43	1.80	2.2	2.2	555	244	246	62	79	78	3
	10	1255	583.2	1.8	2.15	2.2	555	253	253	61	82	78	4
	15	1300	288.01	1.8	2.2	2.2	554	252	255	61	84	78	5
	20	1305	291.32	1.8	2.15	2.2	555	254	253	60	85	78	5
	25	1310	296.74	1.8	2.16	2.2	554	253	259	59	86	78	6
	30	1315	299.63	1.8	2.16	2.2	553	254	252	55	86	79	6
	35	1320	304.21	1.8	2.16	2.2	552	253	250	54	86	79	6
	40	1325	308.29	1.8	2.16	2.2	552	253	252	53	86	79	7
	45	1330	312.11	1.8	2.16	2.2	551	254	253	53	86	79	7
	50	1335	316.76	1.8	2.17	2.2	551	253	254	54	87	79	8
	55	1340	321.02	1.8	2.17	2.2	549	254	256	55	87	79	8
	60	1345	324.907	1.8	2.16	2.2	554	255	254	55	87	79	8

ΔVm = 49.657 $\overline{\sqrt{\Delta p}}$ = 1.3416 $\overline{\Delta H}$ = 2.2 $\overline{Ts}$ = 553 $\overline{Tm}$ = 82

Bws = 4.3% acfm = 646.2 dscfm = 321.3 I = 100.0

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elwendort Run No. E-25-2
Date ____ Sample Box No. SB-3 Job No. 30147.0007-002
Sample Location Gen-A - Exhaust - 25% Filter No. PC024
Train Preparer DA
Sample Recovery Person Rh
Comments Method 5/202 train

Front Half
Acetone Container No. ____ Liquid Level Marked ____ Sealed ____

Filter
Container No. ____ Sealed ____

Description of Filter ____

Samples Stored and Locked ____

Back Half/Moisture
Container No. ____

Liquid Level Marked ____ Sealed ____

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	DI H_2O	100	719.3	773.4	54.1 ✓
2	"	100	719.7	694.8	-24.9 ✓
3	—	—	623.0	626.0	3.0 ✓
4	SG	250	902.8	917.1	14.3 ✓
5					
6					
Total					46.5 ✓

Description of Impinger Catch: ____

FIELD DATA SHEET

25% load

Plant: Elmendorf AFB
Sample Type: MS/202
Operator: [illegible]
Nozzle ID: 201
Thermocouple #:

Sampling Location: Generator Exhaust
Pbar: 29.90
Ps: -2
Assumed Bws: 4
Filter #: 830231

Run Number: E-25-5-3
Date: 6-25-02
CO_2: 4
O_2: 15
Meter Box #: 7
Y: 1.001
$\Delta H@$: 1.775

Pretest Leak Rate: .006 cfm @ 16 in.Hg.
Probe Length/Type: 2' Glass
Pitot#: N/A
Post-Test Leak Rate: .002 cfm @ 5 in.Hg.

Pretest Leak Check: Pitot: N/A Orsat: N/A
Stack Diameter: 4"
As:
Post-Test Leak Check: Pitot: N/A Orsat: N/A

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (In. Hg)
	0	1405	325.221										
	5	1410	329.33	1.8	2.14	2.1	554	249	255	63	79	78	1
	10	1415	333.41	1.8	2.14	2.1	557	252	255	63	80	78	2
	15	1420	337.86	1.8	2.15	2.2	555	252	255	64	82	78	2
	20	1425	341.90	1.8	2.15	2.2	555	254	253	61	84	78	2
	25	1430	346.52	1.8	2.15	2.2	557	254	254	60	86	78	3
	30	1435	350.32	1.8	2.15	2.2	555	253	252	60	86	78	3
	35	1440	355.47	1.8	2.16	2.2	555	253	256	60	87	78	3
	40	1445	358.47	1.8	2.16	2.2	554	252	254	60	87	79	3
	45	1450	362.88	1.8	2.15	2.2	557	251	250	62	87	79	4
	50	1455	367.39	1.8	2.16	2.2	556	253	253	62	87	79	4
	55	1500	371.25	1.8	2.16	2.2	552	253	253	63	87	79	5
	60	1505	375.337	1.8	2.17	2.2	551	253	250	64	88	79	5

ΔVm = 50.116 $\overline{\sqrt{\Delta p}}$ = 1.3416 $\overline{\Delta H}$ = 2.18 $\overline{Ts}$ = 555 $\overline{Tm}$ = 82

Bws = 4.1 acfm = 647.2 dscfm = 321.2 Iso = 101.0

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elmendorf

Run No. E-25-5-3

Date 6/25/02 Sample Box No. SB-1

Job No. 30174.0003.002

Sample Location Gen. 1 - Exhaust -

Filter No. 830231

Train Preparer DA

Sample Recovery Person DA

Comments

Front Half

Acetone Container No. ________ Liquid Level Marked ______ Sealed ________

Filter Container No. ________ Sealed ________

Description of Filter ________

Samples Stored and Locked ________

Back Half/Moisture

Container No. ________

Liquid Level Marked ________ Sealed ________

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	DI H_2O	100	729.0	746.3	17.3 ✓
2	"	100	734.1	744.4	10.3 ✓
3	—	—	626.2	627.5	1.3 ✓
4	SG	250	848.2	863.6	15.4 ✓
5					
6					
Total					44.3 ✓

Description of Impinger Catch: 1st Imp, Cloudy

$\left(\frac{143.3}{99.76}\right)$

EQ Environmental Quality Management, Inc.

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Elmendorf AFB Date: 6/25/02

Sampling Location: Generator Outlet Clock Time: ______

Run #: 50% load Operators: MK / TG

Barometric Pressure, in.Hg: 29.90 Static Pressure, in.H_2O: ______

Moisture, %: ______ Molecular wt., Dry: ______ Pitot Tube, Cp: 0.99

Stack Dimension, in. Diameter or Side 1: 3" Side 2: ______

Wet Bulb, °F: ______ Dry Bulb, °F: ______

Pitot # ______ Thermocouple # ______

5.8, 12.9

$\Delta P = 6.58$
$\sqrt{\Delta P} = 2.57$
$Ts = 719$
acfm = 778
dscfm = 317
static = -3.0"

Time	Traverse Point Number	Velocity Head in.H_2O	Stack Temp, °F
@ 1608	1	6.4	719
	2	6.6	719
	3	6.6	719
	1	6.5	720
	2	6.8	720
	3	6.6	719
@ 1730	1	7.1	725
	2	7.2	726
	3	7.3	726
	1	7.2	727
	2	6.9	728
	3	6.9	729
@ 1847	1	7.1	731
	2	7.1	730
	3	7.0	730
	1	7.1	729
	2	6.9	726
	3	7.0	726
		$\overline{\sqrt{\Delta P}}$ =	$\overline{Ts}$ =

$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 \times \% N_2)$

$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$

Md =

$Ms = Md \times \left(1 - \frac{\% H_2O}{100}\right) + 18\left(\frac{\% H_2O}{100}\right)$

$Ms = (\quad) \times \left(1 - \frac{}{100}\right) + 18\left(\frac{}{100}\right)$

Ms =

$\overline{Ts}$ = °F = °R(°F + 460)

$\Delta P = 7.1$
$\sqrt{\Delta P} = 2.664$
$Ts = 727$
static = -3.00"
Vs = 265.4
acfm = 781.6
dscfm = 327.7

$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{}{13.6}$

Ps = in. Hg

$\overline{\sqrt{\Delta P}}$ =

$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$

$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$

Vs = ft^2

As = ft^2

static = -3.0"

Qs = Vs × As × 60 s/m

Qs = × × 60

Qs = acfm

Qs = dscfm

FIELD DATA SHEET — 50% load

Plant: Elmendorf AFB Sample Type: ms/202 Operator: AWB Nozzle ID: .201 Thermocouple #: ____

Sampling Location: Generator Exaust Pbar: 29.90 Ps: -3in Assumed Bws: 4 Filter #: 830230

Run Number: E-50-51 Date: 6-25-02 CO_2: 4 O_2: 15 Meter Box #: 7 Y: 1.001 ΔH@: 1.775

Pretest Leak Rate: .002 cfm @ 10 in.Hg. Probe Length/Type: 2' Glass Pitot#: ____ Post-Test Leak Rate: .004 cfm @ 16 in.Hg.

Pretest Leak Check: Pitot: ____ Orsat: ____ Stack Diameter: 4" As: ____ Post-Test Leak Check: Pitot: N/A Orsat: N/A

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1520	375.638										
	5	1525	380.31	2.0	2.06	2.0	712	257	257	65	78	78	2
	10	1530	384.75	2.0	2.06	2.0	711	252	255	63	80	78	3
	15	1535	389.26	3.0	3.09	3.1	717	252	254	59	82	78	5
	20	1540	393.99	3.0	3.09	3.1	718	261	254	56	85	78	6
	25	1545	398.96	3.0	3.09	3.1	721	263	257	56	86	78	7
	30	1550	403.61	3.0	3.10	3.1	718	266	253	56	86	78	9
	35	1555	408.53	3.0	3.11	3.1	714	267	253	57	87	78	9
	40	1600	413.36	3.0	3.10	3.1	718	263	252	60	87	79	10
	45	1605	418.52	3.0	3.10	3.1	717	263	252	61	86	79	12
	50	1610	422.99	3.0	3.10	3.1	718	266	252	64	88	79	13
	55	1615	428.21	3.0	3.09	3.1	721	264	252	66	85	79	14
	60	1620	432.633	3.0	3.07	3.1	727	265	252	68	85	79	16

$\Delta Vm = 56.995$ ✓ $\sqrt{\Delta p} = 1.6791$ ✓ $\overline{\Delta H} = 2.92$ ✓ $\overline{Ts} = 718$ ✓ $\overline{Tm} = 82$ ✓

Bws = 5.4 ✓ acfm = 876.0 dscfm = 368.5 ISO = 100.3%

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elmendorf Run No. E-50-5-1
Date 6/25/02 Sample Box No. SB-2 Job No. 30174-0007-002
Sample Location Gen-1 Exhaust – 50% Filter No. 830230
Train Preparer DA
Sample Recovery Person DA
Comments

Front Half
Acetone Container No. Liquid Level Marked Sealed

Filter
Container No. Sealed

Description of Filter

Samples Stored and Locked

Back Half/Moisture
Container No.

Liquid Level Marked Sealed

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H2O	100	717.0	770.0	53 ✓
2	11	100	733.2	725.9	-7.3 ✓
3	—	—	637.3	642.5	5.2 ✓
4	SG	250	929.7	947.0	17.3 ✓
5					
6					
Total					68.2 ✓

Description of Impinger Catch:

FIELD DATA SHEET

50% load

Plant: Elmendorf AFB Sample Type: M5/202 Operator: AWS
Sampling Location: Generator Exhaust Pbar: 29.90 Ps: -3.0"
Run Number: E-50-5-2 Date: 6-25-02 CO_2: 5.9 O_2: 12.8
Pretest Leak Rate: .006 cfm @ 10 in.Hg. Probe Length/Type: 2' Glass Pitot#: ____
Pretest Leak Check: Pitot: ____ Orsat: ____ Stack Diameter: 4" As: ____

Nozzle ID: .201 Thermocouple #: ____
Assumed Bws: 4 Filter #: PC021
Meter Box #: 1 Y: 1.001 ΔH@: 1.795
Post-Test Leak Rate: .006 cfm @ 12 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1645	433.013										
	5	1650	437.75	2.2	2.23	2.2	729	245	258	62	77	77	4
	10	1655	444.45	2.1	2.14	2.1	722	253	255	57	78	77	5
	15	1700	445.76	2.1	2.14	2.1	727	251	255	63	81	77	5
	20	1705	449.99	2.1	2.15	2.1	724	251	253	63	83	77	6
	25	1710	454.04	2.1	2.14	2.1	727	252	251	64	85	77	7
	30	1715	457.82	2.1	2.15	2.1	722	251	252	64	85	77	8
	35	1720	461.73	2.1	2.15	2.1	725	252	250	66	86	78	9
	40	1725	465.98	2.1	2.15	2.1	725	253	253	66	86	78	9
	45	1730	469.77	2.1	2.15	2.1	727	251	252	68	86	78	10
	50	1735	473.65	2.1	2.14	2.1	731	251	253	67	86	78	10
	55	1740	477.52	2.1	2.15	2.1	727	253	252	69	86	78	12
	60	1745	481.493	2.1	2.14	2.1	734	252	252	71	86	79	12

ΔVm = 48.480 ✓ $\overline{\sqrt{\Delta p}}$ = 1.4520 ✓ $\overline{\Delta H}$ = 2.11 ✓ $\overline{Ts}$ = 727 ✓ $\overline{Tm}$ = 81 ✓

Bws = 5.5 ✓ acfm = 757.9 dscfm = 316.0 %I = 99.5

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elmendorf AFB	Run No. E-50-5-2
Date 6/25/02	Sample Box No. SB-3	Job No. 30174.0003.002
Sample Location Generator Outlet - 50%	Filter No. PC021
Train Preparer Dh
Sample Recovery Person DA
Comments Method 5/202 train

Front Half

Acetone Container No. ________ Liquid Level Marked ______ Sealed ______________

Filter Container No. ______________ Sealed ______________

Description of Filter ______________

Samples Stored and Locked ______________

Back Half/Moisture

Container No. ______________

Liquid Level Marked ______________ Sealed ______________

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	~~DI~~ H_2O	100	717.0	764.9	47.9 ✓
2	~~[illegible]~~	100	722.7	710.1	-12.6 ✓
3	Empty	—	623.7	626.6	2.9 ✓
4	~~[illegible]~~ Gel	250	867.0	888.1	21.1 ✓
5					
6					
Total					59.3 ✓

Description of Impinger Catch: ______________

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FIELD DATA SHEET

50% load

Plant: Elmendorf AFB　Sample Type: MS/202　Operator: AWG

Sampling Location: Generator Exaust　Pbar: 29.90　Ps:

Run Number: G-50-5-3　Date: 6-25-02　CO_2:　O_2:

Pretest Leak Rate: .006 cfm @ 10 in.Hg.　Probe Length/Type: 2' glass　Pitot#:

Pretest Leak Check: Pitot: ____ Orsat: ____　Stack Diameter: 4"　As:

Nozzle ID: .201　Thermocouple #:

Assumed Bws: 4　Filter #: 830227

Meter Box #: 7　Y: 1.001　ΔH@: 1.775

Post-Test Leak Rate: .006 cfm @ 7 in.Hg.

Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1800	481.472										
	5	1805	486.99	2.1	2.13	2.1	730	211	254	58	79	78	1
	10	1810	489.99	2.1	2.12	2.1	738	254	258	59	81	78	1
	15	1815	494.13	2.1	2.12	2.1	738	252	254	56	84	78	2
	20	1820	497.89	2.1	2.14	2.1	733	256	257	54	86	78	3
	25	1825	502.09	2.1	2.15	2.1	731	254	251	55	87	79	4
	30	1830	506.42	2.1	2.15	2.1	731	251	252	56	88	79	4
	35	1835	510.44	2.1	2.15	2.1	730	251	252	57	88	79	5
	40	1840	514.29	2.1	2.15	2.1	729	252	251	58	88	79	5
	45	1845	517.99	2.1	2.14	2.1	734	253	252	59	88	80	5
	50	1850	522.19	2.1	2.15	2.1	731	252	252	57	89	80	6
	55	1855	526.24	2.1	2.16	2.1	726	253	251	59	89	80	7
	60	1900	530.375	2.1	2.16	2.1	726	252	253	61	89	80	7

$\Delta Vm =$ 48.403　$\overline{\sqrt{\Delta p}} =$ 1.449　$\overline{\Delta H} =$ 2.1　$\overline{Ts} =$ 731　Bws = 5.4　$\overline{Tm} =$ 83

vs = 144.2　acfm = 754.9　dscfm = 314.8

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elrendorf — Run No. E-50-M5-3
Date 6/26/02 — Sample Box No. 48.5 — Job No. 20174.0083-002
Sample Location Grail — — Filter No. 830227
Train Preparer D. Allen
Sample Recovery Person [illegible signature]
Comments ________

Front Half
Acetone Container No. ________ Liquid Level Marked ________ Sealed ________

Filter
Container No. ________ Sealed ________

Description of Filter ________

Samples Stored and Locked ________

Back Half/Moisture
Container No. ________

Liquid Level Marked ________ Sealed ________

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H2O	100	728.8	798.6	69.8 ✓
2	"	100	739.9	711.7	-28.2 ✓
3	—	—	633.4	634.6	1.2 ✓
4	S.G.	250	847.1	861.4	14.3 ✓
5					
6					
Total					57.1 ✓

Description of Impinger Catch: 1st impinger cloudy

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27526

919-552-3991

Environmental Quality Management, Inc.

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Elmendorf AFB Date: 6/26/02
Sampling Location: Generator Outlet Clock Time:
Run #: 75% Operators:
Barometric Pressure, in.Hg: 29.90 Static Pressure, in.H_2O:
Moisture, %: Molecular wt., Dry: Pitot Tube, Cp: 0.99
Stack Dimension, in. Diameter or Side 1: 3" Side 2:
Wet Bulb, °F: Dry Bulb, °F:
Pitot # Thermocouple #

	Traverse Point Number	Velocity Head in.H_2O	Stack Temp, °F
6/26 @	1	9.7	789
	2	9.9	790
	3	10.0	787
	1	10.0	792
	2	9.0	785
	3	9.3	785
6/27 @	1	10.5	812
	2	10.7	813
	3	10.8	813
	1	10.5	812
	2	9.5	814
	3	9.6	815
6/27 @ 1740	1	9.1	828
	2	9.1	830
	3	8.9	831
	1	9.0	821
	2	9.0	822
	3	9.3	821
		$\overline{\sqrt{\Delta P}}$ =	$\overline{Ts}$ =

$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 \times \% N_2)$

$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$

Md =

$Ms = Md \times \left(1 - \frac{\% H_2O}{100}\right) + 18\left(\frac{\% H_2O}{100}\right)$ static = -2.5"

$Ms = (\quad) \times \left(1 - \frac{}{100}\right) + 18\left(\frac{}{100}\right)$

Ms =

$\overline{Ts} =$ °F = °R(°F + 460) $\Delta P = 10.27$ Ts = 813
$\overline{\Delta P} = 320$

$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{}{13.6}$ Static = -2.00"

Ps = in. Hg

$\overline{\sqrt{\Delta P}} =$

$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$

$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$

Vs = ft^2

Static = -2.00"

As = ft^2

Qs = Vs × As × 60 s/m

Qs = × × 60

Qs = acfm

Qs = dscfm

KFactor = 1.416326037

FIELD DATA SHEET

75%

Plant: Elmendorf AFB   Sample Type: M5/202   Operator: AWB
Sampling Location: Generator Exhaust   Pbar: 29.90   Ps: -2.5
Run Number: E-75-5-1   Date: 6-26-02 CO_2: 6.2 O_2: 11.8
Pretest Leak Rate: .004 cfm @ 10 in.Hg.   Probe Length/Type: 2' Glass   Pitot#: N/A
Pretest Leak Check: Pitot: ____ Orsat: ____   Stack Diameter: 4"   As: ____

Nozzle ID: .180   Thermocouple #: ____
Assumed Bws: 4   Filter #: 830219
Meter Box #: 7   Y: 1.001 $\Delta H@$: 1.775
Post-Test Leak Rate: .002 cfm @ 10 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1035	530.634										
	5	1040	534.53	2.99	1.85	1.9	742	253	253	54	67	67	1
	10	1045	538.38	2.99	1.81	1.8	774	252	252	51	68	67	1
	15	1050	542.09	2.99	1.80	1.8	778	252	250	48	69	67	1
	20	1055	545.78	2.99	1.80	1.8	782	253	251	49	71	68	2
	25	1100	549.38	2.99	1.80	1.8	783	251	253	49	73	68	3
	30	1105	553.06	2.99	1.80	1.8	788	251	251	50	75	68	3
	35	1110	556.89	2.99	1.81	1.8	786	252	253	51	77	69	4
	40	1115	560.39	2.99	1.81	1.8	785	253	252	51	78	69	5
	45	1120	563.91	2.99	1.81	1.8	787	252	252	52	79	70	5
	50	1125	568.00	2.99	1.81	1.8	789	252	253	54	80	71	6
	55	1130	571.59	2.99	1.81	1.8	789	252	253	55	81	71	6
	60	1135	575.013	2.99	1.82	1.8	788	251	252	56	81	72	7

ΔVm = 44.979 ✓ $\overline{\sqrt{\Delta p}}$ = 1.7292 ✓ $\overline{\Delta H}$ = 1.81 ✓ $\overline{Ts}$ = 781 ✓ $\overline{Tm}$ = 72

Bws = 5.4 ✓   acfm = 922.0   dscfm = 368.6   %I = 100.2

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elmendorf
Date 6/20/02 Sample Box No. SB-1
Sample Location Gen. 1 - Exhaust
Train Preparer DA
Sample Recovery Person
Comments

Run No. E-75-5-1
Job No. 30174.0003.002
Filter No. 830219

Front Half
Acetone Container No. ____ Liquid Level Marked ____ Sealed ____

Filter
Container No. ____ Sealed ____

Description of Filter ____

Samples Stored and Locked ____

Back Half/Moisture
Container No. ____

Liquid Level Marked ____ Sealed ____

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	DI H_2O	100	730.6	800.8	70.2 ✓
2	"	100	730.7	703.7	-27.0 ✓
3	—	—	626.7	626.6	-0.1 ✓
4	SG.	250	863.6	875.0	11.4 ✓
5					
6					
Total					54.5 ✓

Description of Impinger Catch: ____

FIELD DATA SHEET

Plant: Elmendorf AFB Sample Type: Part Operator: AWB Nozzle ID: 0.180 Thermocouple #: ______
Sampling Location: Generator Outlet Pbar: 29.90 Ps: ~ 2.0" Assumed Bws: 5 Filter #: BC020
Run Number: E-75-5-2 Date: 6-27-02 CO_2: 6.6 O_2: 12.0 Meter Box #: 7 Y: 1.001 ΔH@: 1.775
Pretest Leak Rate: .004 cfm @ 12 in.Hg. Probe Length/Type: 2' Glass Pitot#: ______ Post-Test Leak Rate: 0.005 cfm @ 10 in.Hg.
Pretest Leak Check: Pitot: ______ Orsat: — Stack Diameter: 4" As: ______ Post-Test Leak Check: Pitot: ______ Orsat: —

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
0	0	1523	701.787										
1	5	1528	705.64	2.9	1.7	1.7	808	240	256	66	73	73	3
2	10	1533	709.12	2.9	1.68	1.7	815	283	255	56	75	73	3
3	15	1538	712.87	2.9	1.72	1.7	815	252	253	56	78	73	4
4	20	1543	716.49	2.9	1.72	1.7	816	252	252	56	80	74	4
5	25	1548	—	2.9	1.73	1.7	813	251	252	54	81	74	5
6	30	1553	723.7	2.9	1.73	1.7	816	252	251	55	82	74	6
7	35	1558	727.2	2.9	1.7	1.7	808	253	252	53	83	74	6
8	40	1603	730.7	2.9	1.7	1.7	809	252	252	54	83	75	7
9	45	1608	734.3	2.9	1.7	1.7	811	252	251	54	83	75	8
10	50	1613	738.7	2.9	1.7	1.7	815	252	252	55	84	75	8
11	55	1618	741.5	2.9	1.7	1.7	816	252	252	57	84	76	9
12	60	1623	745.152	2.9	1.7	1.7	810	251	251	56	84	76	9

ΔVm = 43.365 ✓ $\sqrt{\Delta p}$ = 1.703 ✓ $\overline{\Delta H}$ = 1.70 ✓ $\overline{Ts}$ = 813 ✓ Bws = 5.7% $\overline{Tm}$ = 77.6 ✓

Δp = 2.9
acfm = 918.4
dscfm = 357.4

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elmendorf AFB
Run No. E-75-5-2
Date 6/27/02
Sample Box No. SB-5
Job No. 30174.0003.002
Sample Location Gen. A Exhaust - 75%
Filter No. 1C020
Train Preparer D.A.
Sample Recovery Person DA
Comments ______

Front Half
Acetone Container No. ______ Liquid Level Marked ______ Sealed ______

Filter Container No. ______ Sealed ______

Description of Filter ______

Samples Stored and Locked ______

Back Half/Moisture
Container No. ______

Liquid Level Marked ______ Sealed ______

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	DEIW	100	730.2	761.8	31.6 ✓
2	"	100	740.6	751.7	11.1 ✓
3	—	—	633.2	634.6	1.4 ✓
4	SG.	250	849.1	859.8	10.7 ✓
5					
6					
Total					54.8 ✓

Description of Impinger Catch: ______

8 - 1

FIELD DATA SHEET

Plant: Elmendorf AFB Sample Type: 5/202 Operator: Rh Nozzle ID: 0.180 Thermocouple #: 2-7

Sampling Location: Generator Outlet Pbar: 29.90 Ps: -2.5 Assumed Bws: 5 Filter #: 830310

Run Number: E-75-5-3 Date: 6/27/02 CO_2: 6.3 O_2: 12.4 Meter Box #: 7 Y: 1.001 ΔH@: 1.78

Pretest Leak Rate: ___ cfm @ ___ in.Hg. Probe Length/Type: 2' Glass Pitot#: — Post-Test Leak Rate: .002 cfm @ 11 in.Hg.

Pretest Leak Check: Pitot: ___ Orsat: ___ Stack Diameter: 4" As: ___ Post-Test Leak Check: Pitot: ___ Orsat: ___

stopped at 1656 restart at 1707

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1642	745.343										
	5	1647	748.9	2.9	1.7	1.7	816	230	253	65	77	76	2
	10	1652	752.6	2.9	1.7	1.7	817	251	258	43	78	75	2
	15	1708	756.5	2.9	2.3	2.3	492	249	252	44	76	76	2
	20	1713	760.3	2.9	1.7	1.7	762	252	252	68	76	75	3
	25	1718	764.0	2.9	1.7	1.7	815	252	252	45	81	76	4
	30	1723	767.5	2.9	1.7	1.7	821	252	252	46	83	76	6
	35	1728	771.0	2.9	1.7	1.7	819	253	252	47	84	77	6
	40	1733	775.1	2.9	1.7	1.7	819	252	252	47	85	77	7
	45	1738	777.9	2.9	1.7	1.7	809	251	252	47	85	77	8
	50	1743	781.8	2.9	1.7	1.7	813	252	251	47	85	77	9
	55	1748	785.3	2.9	1.7	1.7	824	252	252	47	85	78	10
	60	1753	788.795	2.9	1.7	1.7	821	253	252	48	85	78	11

ΔVm = 43.452 $\overline{\sqrt{\Delta p}}$ = 1.703 $\overline{\Delta H}$ = 1.75 $\overline{Ts}$ = 786 $\overline{Tm}$ = 79

Bws: 6.3 dsstm ~~acfm~~ = 359.4 acfm = 910.7 I50 = 97.9

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elmendorf AFB   Run No. E-75-5-3

Date 6/21/02   Sample Box No. SB-2   Job No. 30174-0003-012

Sample Location Gen.l Exhaust   Filter No. 830130

Train Preparer DA

Sample Recovery Person [illegible]

Comments 5/202 train

Front Half

Acetone Container No. ______ Liquid Level Marked ______ Sealed ______

Filter Container No. ______ Sealed ______

Description of Filter ______

Samples Stored and Locked ______

Back Half/Moisture

Container No. ______

Liquid Level Marked ______ Sealed ______

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H2O	100	719.7	783.9	64.2 ✓
2	"	100	736.2	716.7	-19.5 ✓
3	—	—	636.6	636.4	-0.2 ✓
4	SG	200	881.8	897.5	15.7 ✓
5					
6					
Total					~~60.6~~ 60.2 TD

Description of Impinger Catch: ______

$\left(\frac{167.4}{105.25}\right)^2$

Environmental Quality Management, Inc.

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant: Elmendorf AFB Date: 6/26/02
Sampling Location: Generator Outlet Clock Time: ______
Run #: 100 % Operators: RL/TG
Barometric Pressure, in.Hg: 29.90 Static Pressure, in.H_2O: ______
Moisture, %: ______ Molecular wt., Dry: ______ Pitot Tube, Cp: 0.99
Stack Dimension, in. Diameter or Side 1: ______ Side 2: ______
Wet Bulb, °F: ______ Dry Bulb, °F: ______
Pitot # ______ Thermocouple # ______

$O_2 = 11.4$ $CO_2 = 6.9$

	Traverse Point Number	Velocity Head in.H_2O	Stack Temp, °F
	1	7.8	841
6/27 1115	2	8.4	839
	3	8.2	842
	1	8.4	840
	2	8.0	838
	3	7.9	837
	1	8.2	851
	2	8.5	851
6/27 @ 1210	3	8.3	850
	1	7.8	852
	2	7.7	852
	3	8.0	852
	1		
	2	10.5	833
	3	10.7	827
	1	10.8	826
	2	11.0	830
	3	11.0	831
		10.8	832
		$\overline{\sqrt{\Delta P}}$ =	$\overline{Ts}$ =

$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 \times \% N_2)$

$Md = (0.44 \times \quad) + (0.32 \times \quad) + (0.28 \times \quad)$

$\Delta P = 8.12$ $P_{bs} = 5.5$
$\sqrt{\Delta P} = 2.85$
$Ts = 840$

$Md =$

$Ms = Md \times \left(1 - \frac{\% H_2O}{100}\right) + 18\left(\frac{\% H_2O}{100}\right)$ $P_s = -3.1''$

$Ms = (\quad) \times \left(1 - \frac{}{100}\right) + 18\left(\frac{}{100}\right)$

$vs = 296.7$
acfm = 874
dscfm = 372

$Ms =$

$\overline{Ts} =$ °F = °R(°F + 460)

$\Delta P = 8.1$
$\sqrt{\Delta P} = 2.84$
$Ts = 851$
$P_s = -2.8''$

$Ps = Pb + \frac{S.P.}{13.6} = (\quad) + \frac{}{13.6}$

$Ps =$ in. Hg

$\overline{\sqrt{\Delta P}} =$

$Vs = 85.49 \times Cp \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{Ts(°R)}{Ps \times Ms}}$

$Vs = 85.49 \times (\quad) \times (\quad) \times \sqrt{\quad}$

$Vs =$ ft^2

$As =$ ft^2 $P_s = -2.6''$

$Qs = Vs \times As \times 60 s/m$

$Qs = \quad \times \quad \times 60$

$Qs =$ acfm

$Qs =$ dscfm

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FIELD DATA SHEET

100% load

Plant: Elmendorf AFB Sample Type: MS/202 Operator: AWG
Sampling Location: Generator Exaust Pbar: 29.90 Ps: -3.3'
Run Number: E-100-5-1 Date: 6-26-02 CO_2: 7.0 O_2: 11.6
Pretest Leak Rate: .004 cfm @ 10 in.Hg. Probe Length/Type: 2' glass Pitot#: N/A
Pretest Leak Check: Pitot: ____ Orsat: ____ Stack Diameter: 4" As: ____

Nozzle ID: 180 Thermocouple #: ____
Assumed Bws: 4 Filter #: 830311
Meter Box #: 9 Y: 1.001 ΔH@: 1.775
Post-Test Leak Rate: .004 cfm @ 10 in.Hg.
Post-Test Leak Check: Pitot: ____ Orsat: ____

576.062

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1020	~~575.481~~										
	5	1025	[illegible]	3.2	1.86	1.9	820	259	254	55	67	66	1
	10	1030	583.49	3.2	1.85	1.9	831	251	262	49	67	66	1
	15	1035	587.02	3.2	1.85	1.9	826	252	260	49	68	66	1
	20	1040	591.16	3.2	1.86	1.9	823	251	252	48	71	67	3
	25	1045	594.34	3.2	1.86	1.9	826	252	248	48	73	67	4
	30	1050	598.36	3.2	1.86	1.9	828	252	249	48	74	67	5
	35	1055	601.90	3.2	1.87	1.9	825	251	254	48	76	68	6
	40	1100	606.19	3.2	1.87	1.9	827	251	254	48	77	69	7
	45	1105	609.29	3.2	1.86	1.9	834	252	252	48	78	69	8
	50	1110	613.29	3.2	1.86	1.9	839	253	249	48	79	70	8
	55	1115	616.96	3.2	1.86	1.9	841	252	252	47	80	70	10
	60	1120	620.520	3.2	1.86	1.9	840	253	284	48	80	71	10

$\Delta Vm = 44.458$ ✓ $\overline{\sqrt{\Delta p}} = 1.7889$ ✓ $\overline{\Delta H} = 1.9$ ✓ $\overline{Ts} = 870$ ✓ $\overline{Tm} = 71$ ✓

Bws ~ 7.9 ✓ acfm : 976.4 dscfm = 365.0 Pso ≈ 100%

FIELD DATA SHEET

100% load

Plant: Elmendorf AFB
Sample Type: MS/202
Operator: AWB
Nozzle ID: .180
Thermocouple #: 2-7

Sampling Location: Generator Exhaust
Pbar: 29.90
Ps: -3.0
Assumed Bws: 4
Filter #: PC022

Run Number: E-100-S-2
Date: 6-27-02
CO_2: 7
O_2: 11.6
Meter Box #: 7
Y: 1.001
ΔH@: 1.915

Pretest Leak Rate: .004 cfm @ 10 in.Hg.
Probe Length/Type: 2' Glass
Pitot#: NA
Post-Test Leak Rate: .002 cfm @ 15 in.Hg.

Pretest Leak Check: Pitot: N/A
Orsat: N/A
Stack Diameter: 4"
As:
Post-Test Leak Check: Pitot:
Orsat:

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1205	620.971										
	5	1210	624.6	3.20	1.88	1.9	838	253	252	56	71	71	4
	10	1215	628.2	3.20	1.86	1.9	843	254	255	48	71	71	5
	15	1220	632.8	3.20	1.86	1.9	852	252	252	52	74	77	6
	20	1225	636.1	3.20	1.86	1.9	850	252	252	54	78	71	9
	25	1230	639.2	3.20	1.86	1.9	853	252	252	54	79	72	10
	30	1235	643.0	2.5	1.4	1.4	853	252	252	55	79	72	11
	35	1240	646.0	2.5	1.4	1.4	846	252	252	56	79	72	12
	40	1245	649.1	2.5	1.4	1.4	843	252	251	57	79	72	12
	45	1250	652.3	2.5	1.4	1.4	843	252	253	57	79	72	13
	50	1255	655.43	2.5	1.4	1.4	851	251	253	58	80	73	14
	55	1300	658.95	2.5	1.4	1.4	848	252	253	59	79	73	14
	60	1305	661.968	2.5	1.44	1.4	857	250	253	62	79	73	16

ΔVm = 40.997 ✓ $\overline{\sqrt{\Delta p}}$ = 1.6677 ✓ $\overline{\Delta H}$ = 1.61 ✓ $\overline{Ts}$ = 848 ✓ $\overline{Tm}$ = 75 ✓

Bws = 6.0 acfm = 912.8 dscfm = 343.6 ISO = 97.4%

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elmendorf AFB
Date 6/26/02 Sample Box No. SB-5
Sample Location Generator Outlet - 100%
Train Preparer [illegible]
Sample Recovery Person D. Allen
Comments 1/25/202 [illegible]

Run No. E-100-5-1
Job No. 30174.0003.002
Filter No. 830311

Front Half
Acetone Container No. ______ Liquid Level Marked ______ Sealed ______

Filter Container No. ______ Sealed ______

Description of Filter ______

Samples Stored and Locked ______

Back Half/Moisture
Container No. ______

Liquid Level Marked ______ Sealed ______

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H2O	100	723.7	803.0	79.3
2	DI H2O	100	736.8	713.2	-23.6
3	—	-	629.3	633.1	3.8
4	Silica Gel	250	828.0	849.1	21.1
5					
6					
Total					80.6

Description of Impinger Catch: ______

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elmendorf AFB

Run No. E-~~25~~ 100-5-2

Date 6/26/12

Sample Box No. ~~>B~~-3

Job No. ~~30194~~.0003-002

Sample Location Gen. 1 Exhaust - ~~75%~~ 100%

Filter No. PC022

Train Preparer DA

Sample Recovery Person DA

Comments

Front Half

Acetone Container No.

Liquid Level Marked

Sealed

Filter Container No.

Sealed

Description of Filter

Samples Stored and Locked

Back Half/Moisture

Container No.

Liquid Level Marked

Sealed

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net ✓
1	DI H2O	100	721.1	779.7	58.6 ✓
2	"	100	720.2	701.2	-19.0 ✓
3	—	—	624.5	626.4	1.9 ✓
4	SG.	250	888.1	901.7	13.6 ✓
5					
6					
Total					55.1 ✓

Description of Impinger Catch:

FIELD DATA SHEET

Plant: Elmendorf AFB
Sampling Location: Generator Exaust
Run Number: E-100-5-3 Date: 6-27-02
Pretest Leak Rate: .004 cfm @ 10 in.Hg.
Pretest Leak Check: Pitot: _____ Orsat: _____

Sample Type: MS/202 Operator: AWB
Pbar: 29.90 Ps: -3.0"
CO_2: 6-8 O_2: 11.3
Probe Length/Type: 2' Glass Pitot#: _____
Stack Diameter: 4" As: _____

Nozzle ID: .180 Thermocouple #: _____
Assumed Bws: 4 Filter #: 830 3/2
Meter Box #: 7 Y: 1.001 ΔH@: 1.975
Post-Test Leak Rate: .002 cfm @ 10 in.Hg.
Post-Test Leak Check: Pitot: _____ Orsat: _____

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	1325	662.240										
	5	1330	665.88	2.5	1.43	1.4	856	253	256	55	73	72	1
	10	1335	668.89	2.5	1.43	1.4	855	252	257	56	74	72	1
	15	1340	672.15	2.5	1.44	1.4	854	252	257	56	77	73	2
	20	1345	675.36	2.5	1.44	1.4	852	250	251	57	79	73	3
	25	1350	678.79	2.5	1.45	1.4	849	251	254	57	81	73	4
	30	1355	682.0	2.5	1.43	1.4	867	253	252	56	81	73	5
	35	1400	685.5	2.5	1.4	1.4	770	255	253	66	73	72	6
	40	1405	688.6	2.5	1.4	1.4	832	254	255	59	73	72	7
	45	1410	691.8	2.5	1.4	1.4	843	253	252	57	75	72	7
	50	1415	695.1	2.5	1.4	1.4	851	253	252	60	77	72	8
	55	1420	698.4	2.5	1.4	1.4	834	251	252	59	78	73	9
	60	1425	701.563	2.5	1.4	1.4	829	251	252	60	80	73	9

Restart at 1435

ΔVm = 39.323 $\sqrt{\Delta p}$ = 1.5811 $\overline{\Delta H}$ = 1.4 $\overline{Ts}$ = 841 $\overline{Tm}$ = 75

Bws = 6.5 acfm = 864.6 dscfm ≈ 325.3 Iso = 98.6

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant: Elmendorf AFB
Run No. E-100-5-3
Date: 6/27/02
Sample Box No. 5A-1
Job No. 30174.0003.002
Sample Location: Generator Outlet 100%
Filter No. 830312
Train Preparer: ML
Sample Recovery Person: DA
Comments: M5/202 Train

Front Half

Acetone Container No. ________ Liquid Level Marked ______ Sealed ____________

Filter Container No. ____________ Sealed ____________

Description of Filter ____________

Samples Stored and Locked ____________

Back Half/Moisture

Container No. ____________

Liquid Level Marked ____________ Sealed ____________

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DI H2O	100	726.2	793.3	67.1 ✓
2	DI H2O	100	731.2	705.0	-26.2 ✓
3	Empty	–	626.4	625.2	-1.2 ✓
4	Silica Gel	250	855.0	873.2	18.2 ✓
5					
6					
Total					57.9 ✓

Description of Impinger Catch: ____________

FIELD DATA SHEET

K> 1.691

Plant: Elmendorf AFB
Sampling Location: Generator Outlet
Run Number: E-0011-Comp Date: 6/25/03
Pretest Leak Rate: 0.006 cfm @ 12 in.Hg.
Pretest Leak Check: Pitot: — Orsat: —

Sample Type: Aldehydes / Ketones
Pbar: 29.90
CO_2: 3
Probe Length/Type: 2' Glass
Stack Diameter: 4"
Operator: AE
Ps: -1.3
O_2: 17
Pitot#: N/A
As:

Nozzle ID: 0.191 Thermocouple #:
Assumed Bws: 4 Filter #: —
Meter Box #: 4 Y: 1.004 ΔH@: 1.64
Post-Test Leak Rate: 0.051 cfm @ 10 in.Hg.
Post-Test Leak Check: Pitot: — Orsat: —

1- 3.0
2- 3.0
3- 3.2

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	0	0730	686.373										
1	5	0735	690.0	1.81	1.6	1.6	460	250	250	52	66	66	1
2	10	0740	694.0	1.81	1.8	1.8	430	252	249	47	66	66	1
3	15	0745	697.4	1.81	1.8	1.8	430	250	251	46	68	66	1
4	20	0750	700.9	1.81	1.8	1.8	430	250	250	50	72	67	1
5	25	0755	705.0	1.81	1.8	1.8	437	250	250	50	74	67	1
6	30	0800	708.5	1.81	1.8	1.8	440	250	249	55	77	68	1
1	35	1132	712.2	~~1.81~~	~~1.8~~	~~1.8~~	~~546~~	~~250~~	~~250~~	~~56~~	~~78~~	~~74~~	~~1~~
2	40	1137	716.0	1.8	1.8	1.8	547	250	250	56	71	71	1
3	45	1142	719.5	1.8	1.6	1.6	548	251	250	54	73	71	1
4	50	1147	722.9	1.8	1.6	1.6	548	248	249	56	75	71	1
5	55	1152	726.5	1.8	1.6	1.6	549	250	250	59	77	72	1
6	60	1157	730.383	1.8	1.6	1.6	549	248	250	59	79	72	1
1	65	1536	734.0	3.0	2.3	2.3	716	251	246	60	72	72	1
2	70	1541	738.4	3.0	2.3	2.3	720	253	251	56	72	72	1
3	75	1546	743.3	3.0	2.3	2.3	719	251	249	55	74	73	1
4	80	1551	746.6	3.0	2.3	2.3	718	251	250	58	76	72	1
5	85	1556	750.9	3.0	2.3	2.3	714	250	250	58	79	73	1
6	90	1601	755.347	3.0	2.3	2.3	719	251	250	61	81	73	1
										62	83	74	1

10% Load

restart at 1127

25% Load

50% Load Restart at 1531

ΔVm = 93.364 $\overline{\sqrt{\Delta p}}$ = 1.5371 $\overline{\Delta H}$ = 1.98 $\overline{Ts}$ = 621 $\overline{Tm}$ = 72

FIELD DATA SHEET

Plant: Elmendorf AFB Sample Type: [illegible] Operator: [illegible] Nozzle ID: 0.191 Thermocouple #: ____

Sampling Location: Generator Outlet Pbar: 29.9 Ps: -2.00 Assumed Bws: ____ Filter #: —

Run Number: E-0011-Gen Date: 6/26/02 CO_2: 3 O_2: 17 Meter Box #: 4 Y: 1.004 ΔH@: 1.64

Pretest Leak Rate: 0.010 cfm @ 12 in.Hg. Probe Length/Type: 2' 6" Pitot#: std-NA Post-Test Leak Rate: .007 cfm @ 10 in.Hg.

Pretest Leak Check: Pitot: — Orsat: — Stack Diameter: 4" Ø As: ____ Post-Test Leak Check: Pitot: — Orsat: —

1500

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH Desired	ΔH Actual	Stack Temp (Ts)	Temperature °F Probe	Temperature °F Filter	Impinger Temp. °F	Dry Gas Meter Temp. Tm Inlet	Dry Gas Meter Temp. Tm Outlet	Pump Vacuum (in. Hg)
	90	1035	755.543										
1	95	1040	759.6	2.99	2.17	2.2	768	249	250	52	68	68	2
2	100	1045	763.8	2.99	2.16	2.2	776	255	251	44	68	68	1
3	105	1050	767.8	2.99	2.15	2.2	782	251	250	43	70	68	2
4	110	1055	772.3	2.99	2.15	2.2	781	251	250	47	73	68	2
5	115	1100	777.0	2.99	2.15	2.2	786	249	251	51	77	70	2
6	120	1105	~~78~~		2.15	2.2	786	246	250	51	78	70	2
			779.983	2.99									

ΔVm = ____ $\sqrt{\Delta p}$ = ____ $\overline{\Delta H}$ = ____ $\overline{Ts}$ = ____ $\overline{Tm}$ = ____

Environmental Quality Management, Inc.

SAMPLE RECOVERY DATA

Plant Elmendorf AFB
Run No. E-D011-Comp
Date 6/24/02 Sample Box No. HSB-3
Job No. 30174.0003.002
Sample Location Generator Outlet
Filter No. NA
Train Preparer [illegible]
Sample Recovery Person R Blake
Comments

Front Half

Acetone Container No. Liquid Level Marked Sealed

Filter Container No. Sealed

Description of Filter

Samples Stored and Locked

Back Half/Moisture

Container No.

Liquid Level Marked Sealed

Imp. No.	Contents	Initial Vol (ml)	Weight (grams) Initial	Final	Net
1	DNPH	100	720.2	769.4	49.2
2	DNPH	100	727.5	759.6	32.1
3	DNPH	100	714.4	722.4	8.0
4	Silica Gel	250	833.1	855.7	22.6
5					
6					
Total					111.9

Description of Impinger Catch:

Environmental Quality Management, Inc

EPA METHOD 30
VOLATILE ORGANIC SAMPLING TRAIN (VOST) SAMPLING DATA

Company: Elmendorf AFB
Date: 6/25/02
Time:
Meter #: VB-1
Barometric Pressure, in.Hg: 29.90
Ambient Temperature, °F:

City: Anchorage, AK
Location: Generator Outlet
Run #: E-0030-Comp
Y-Factor: 0.9661
Operator: [illegible]
Purge Time:

Vacuum Leak Check Data

	Initial, in.Hg	Final, in.Hg	Time, min.
Pre-test:	25	25	1
Post-test:			

	Sample Time (min)	Clock Time, (24-hr)	Meter Volume, (liter)	Rotameter Setting	Dry Gas Meter Temp., (°F)		Vacuum, (in.Hg)	Probe Temp, °F
	0	0732	6128.53	0.4	63	63	1	241
10%	5	0737	6130.7	0.4	64	64	1	239
	10	0742	6132.2	0.4	64	64	1	240
	15	0747	6133.5	0.4	65	65	1	241
	20	0752	6135.0	0.4	66	66	1	239
	25	0757	6136.5	0.4	67	67	1	239
	30	0802	6138.9	0.4	69	68	1	241
Restart @	35	1137	6139.1	0.4	69	69	1	239
1132	40	1142	6140.0	0.4	69	70	1	240
	45	1147	6141.1	0.4	70	70	1	239
25%	50	1152	6142.1	0.4	71	70	1	240
	55	1157	6143.1	0.4	72	72	1	240
	60	1202	6144.1	0.4	73	72	1	240

Nitrogen purge/activated carbon packing in sample holding container:

$$V_{std} = V_m\,(\text{liters}) \times Y \times 17.647 \times \frac{P_b\,(\text{in.Hg})}{T_m\,(^\circ R)}$$

V_{std}

EQ Environmental Quality Management, Inc.

VOST

EPA METHOD 30
VOLATILE ORGANIC SAMPLING TRAIN (VOST) SAMPLING DATA

Company: Elmendorf AFB
Date: 6/28/02
Time:
Meter #: VB-1
Barometric Pressure, in.Hg 29.90
Ambient Temperature, °F:

City: Anchorage, AK
Location: Generator Outlet
Run #: E-6030-COMP
Y-Factor: 0.9766
Operator: [illegible]
Purge Time:

Vacuum Leak Check Data

	Initial, in.Hg	Final, in.Hg	Time, min.
Pre-test:			
Post-test:			

Restart at 1532

50% Load

Sample Time (min)	Clock Time, (24-hr)	Meter Volume, (liter)	Rotameter Setting	Dry Gas Meter Temp., (°F)		Vacuum, (in.Hg)	Probe Temp, °F
65	1537	6145.1	0.4	70	70	1	240
70	1542	6146.1	0.4	70	70	1	239
75	1547	6147.2	0.4	71	71	1	239
85	1557	6149.2	0.4	73	73	1	240
90	1562	6150.3	0.4	74	73	1	239
~~90~~ start							
95	1045	6152.1	0.4	67	66	1	240
100	1050	6153.7	0.4	67	67	1	240
105	1055	6155.7	0.4	67	67	1	239
110	1100	6157.5	0.4	68	68	1	240
115	1105	6159.4	0.4	~~68~~ 69	69	1	240
120	1110	6161.14	0.4	70	70	1	240

75% Load

Nitrogen purge/activated carbon packing in sample holding container:

$$V_{std} = V_m\,(\text{liters}) \times Y \times 17.647 \times \frac{P_b\,(\text{in.Hg})}{T_m\,(^\circ R)}$$

V_{std}

Environmental Quality Management, Inc.

VOST page 3

EPA METHOD 30
VOLATILE ORGANIC SAMPLING TRAIN (VOST) SAMPLING DATA

Company: Elmendorf AFB
Date: 6/27/02
Time:
Meter #: VB-1
Barometric Pressure, in.Hg: 29.90
Ambient Temperature, °F:

City: Anchorage, AK
Location: Generator Outlet
Run #: E-0030-Comp
Y-Factor: 0.9[illegible]
Operator: [illegible]
Purge Time:

Vacuum Leak Check Data

	Initial, in.Hg	Final, in.Hg	Time, min.
Pre-test:			
Post-test:			

100%

Sample Time (min)	Clock Time, (24-hr)	Meter Volume, (liter)	Rotameter Setting	Dry Gas Meter Temp., (°F)	Vacuum, (in.Hg)	Probe Temp, °F
125	1033	6162.9	0.4	65 65	1	239
130	1038	6164.6	0.4	66 66	1	241
135	1043	6166.5	0.4	67 66	1	241
140	1048	6168.4	0.4	67 67	1	241
145	1053	6170.2	0.4	68 68	1	241
150	1058	6172.05	0.4	69 69	1	241

Nitrogen purge/activated carbon packing in sample holding container:

$$V_{std} = V_m(\text{liters}) \times Y \times 17.647 \times \frac{P_b(\text{in.Hg})}{T_m(^\circ R)}$$

V_{std}

$V_m = 43.520$
$\bar{T_m} = 68.25$

Environmental Quality Management, Inc.

EPA METHOD 30
VOLATILE ORGANIC SAMPLING TRAIN (VOST) SAMPLING DATA

Company: Elmendorf AFB
Date: 6/25/02
Time:
Meter #: VB-2
Barometric Pressure, in.Hg: 29.90
Ambient Temperature, °F:

City: Anchorage, AK
Location: Generator Outlet
Run #: E-PAH-Comp
Y-Factor: 1.0860
Operator: pl
Purge Time:

Vacuum Leak Check Data

	Initial, in.Hg	Final, in.Hg	Time, min.
Pre-test:	25	25	1
Post-test:			

10%

25%
Restart at 1132

Sample Time (min)	Clock Time, 0732 (24-hr)	Meter Volume, (liter)	Rotameter Setting	Dry Gas Meter Temp., (°F)		Vacuum, (in.Hg)	Probe Temp, °F
0	~~5130.9~~	5130.78	0.4	64	64	1	—
5	0737 ~~5133.0~~	5132.0	0.4	65	65	1	—
10	0742	5133.1	0.4	65	65	1	—
15	0747	5134.5	0.4	66	65	1	—
20	0752	5135.8	0.4	66	67	1	—
25	0757	5137.2	0.4	68	67	1	—
30	0802	5138.4	0.4	69	69	1	—
35	1137	5139.6	0.4	70	70	1	—
40	1142	5141.4	0.4	70	70	1	—
45	1147	5143.1	0.4	70	70	1	—
50	1152	5144.7	0.4	71	71	1	—
55	1157	5146.5	0.4	72	72	1	—
60	1202	5148.3	0.4	73	73	1	—

Nitrogen purge/activated carbon packing in sample holding container:

$$V_{std} = V_m(\text{liters}) \times Y \times 17.647 \times \frac{P_b(\text{in.Hg})}{T_m(°R)}$$

V_{std}

Environmental Quality Management, Inc

EPA METHOD 30
VOLATILE ORGANIC SAMPLING TRAIN (VOST) SAMPLING DATA

Company: Elmendorf AFB
Date: 6/25/02
Time:
Meter #: UB-2
Barometric Pressure, in.Hg: 29.90
Ambient Temperature, °F:

City: Anchorage, AK
Location: Generator Outlet
Run #: E-PAH-Comp
Y-Factor:
Operator: [illegible]
Purge Time:

Vacuum Leak Check Data

	Initial, in.Hg	Final, in.Hg	Time, min.
Pre-test:			
Post-test:			

restart at 1534

50% Load

75%

Sample Time (min)	Clock Time, (24-hr)	Meter Volume, (liter)	Rotameter Setting	Dry Gas Meter Temp., (°F)	Vacuum, (in.Hg)	Probe Temp, °F
65	1539	5150.0	0.4	71 71	1	—
70	1544	5151.7	0.4	71 71	1	—
75	1549	5153.2	0.4	72 72	1	—
85	1559	5155.7	0.4	73 73	1	—
90	1604	5157.3	0.4	74 73	1	—
~~90~~						—
95	1045	5159.3	0.4	66 66	~~66~~ 1	—
100	1650	5162.0	0.4	68 68	1	—
105	1055	5162.3	0.4	68 68	1	—
110	1100	5164.0	0.4	69 69	1	—
115	1105	5165.7	0.4	69 69	1	—
120	1110	5167.21	0.4	70 71	1	—

Nitrogen purge/activated carbon packing in sample holding container:

$$V_{std} = V_m(\text{liters}) \times Y \times 17.647 \times \frac{P_b(\text{in.Hg})}{T_m(^\circ R)}$$

V_{std}

EQ Environmental Quality Management, Inc

EPA METHOD 30
VOLATILE ORGANIC SAMPLING TRAIN (VOST) SAMPLING DATA

Company: Elmendorf AFB
Date: 6/27/02
Time: ____
Meter #: VB-2
Barometric Pressure, in.Hg: 29.90
Ambient Temperature, °F: ____

City: Anchorage, AK
Location: Generator Outlet
Run #: E-PAH-Comp
Y-Factor: ____
Operator: [illegible]
Purge Time: ____

Vacuum Leak Check Data

	Initial, in.Hg	Final, in.Hg	Time, min.
Pre-test:			
Post-test:			

1002

Sample Time (min)	Clock Time, (24-hr)	Meter Volume, (liter)	Rotameter Setting	Dry Gas Meter Temp., (°F)	Vacuum, (in.Hg)	Probe Temp, °F
125	1033	5168.7	0.4	65 65	1	—
130	1038	5170.3	0.4	66 66	1	—
135	1043	5171.9	0.4	67 67	1	—
140	1048	5173.5	0.4	68 68	1	—
145	1053	5175.1	0.4	69 69	1	—
150	1058	5176.82	0.4	70 70	1	—

Nitrogen purge/activated carbon packing in sample holding container: ____

$$V_{std} = V_m(\text{liters}) \times Y \times 17.647 \times \frac{P_b(\text{in.Hg})}{T_m(^\circ R)}$$

V_{std}

CEM CALIBRATION DATA SHEET

Company: Elmendorf AFB
Location: Gen. A - Exhaust - 10%
Project No: 3974.0003-002

Operator: D. Allen
Date: 6/25/12

		Cal Gas Conc.	Direct Calibration Response		Post Test Run 1 Response			Post Test Run 2 Response			Post Test Run 3 Response			Comments
			ppm / %	% Error	ppm / %	%Drift	%Bias	ppm / %	%Drift	%Bias	ppm / %	%Drift	%Bias	
			Time: 600-700		Time: 730-815			Time: 0845-0930			Time: 1005-1050			
	Zero	0	0.4	/	0.4			0.4			0.4			
NOx	Low													
	Mid	448	444	445	445			444			444			
0-1000	High	885.5	883	883										
	Zero	0	0.4	0.3	0.4			0.3			0.3			
CO	Low	30.1	29.5	29.7										
	Mid	59.4	58.5	58.7										
0-200	High	149.4	149	149	148			148			148			
	Zero	0	-0.2	2.7	6.3	(0.0)		6.4	(0.0)		6.6	(0.1)		
THC	Low	49.96	48.4	50.1										
(Methane)	Mid	124.6	121	123.5	127	(119)		128	(121)		129	(120)		
0-300	High	298.0	297	295										
	Zero	0	-0.1	0.0	0.0			0.0			0.0			
O_2	Low													
	Mid	10.56	10.5	10.5										
	High	19.99	19.9	20.0	19.9			19.9			19.9			
	Zero	0	-0.2	-0.2	-0.2			-0.1			-0.1			
CO_2	Low													
	Mid	9.97	10.0	10.1	10.0			10.0			10.0			
	High	20.57	20.4	20.4										

CEM CALIBRATION DATA SHEET

Company: Elmendorf AFB
Location: Gen. 4 - Exhaust - 25%
Project No: 30174.0003.002

Operator: D.Alb
Date: 6/25/02

		Cal Gas Conc.	Direct Calibration Response ppm / %	Direct Calibration Response % Error	Post Test Run 1 Response ppm / %	Post Test Run 1 Response %Drift	Post Test Run 1 Response %Bias	Post Test Run 2 Response ppm / %	Post Test Run 2 Response %Drift	Post Test Run 2 Response %Bias	Post Test Run 3 Response ppm / %	Post Test Run 3 Response %Drift	Post Test Run 3 Response %Bias	Comments
			Time: 600-700		Time: 1125-1210			Time: 1245-1330			Time: 1400-1445			
	Zero	0	0.4	0.4	0.4			0.4			0.4			
NO_x	Low			(100)										
	Mid	448	444	444	443			443			442			
(0-1000)	High													
	Zero	0	0.4	0.3	0.4			0.4			0.4			
CO	Low													
	Mid													
(0-200)	High	149.2	149	148	148			148			147			
	Zero	0	0.2	6.6	6.8	(0.1)		6.1	(0.1)		6.7	(0.1)		
THC	Low													
(meth)	Mid	129.6	121	129	130	(121)		126	(116)		126	(111)		
(0-300)	High													
	Zero	0	-0.1	0.0	0.0			0.0			0.0			
O_2	Low													
	Mid													
	High	19.99	19.9	19.9	20.0			20.0			20.0			
	Zero	0	-0.2	-0.1	-0.1			-0.2			-0.2			
CO_2	Low													
	Mid	9.99	10.0	10.0	10.0			10.1			10.1			
	High													

CEM CALIBRATION DATA SHEET

Company: Elmendorf AFB
Location: Gen. A - Exhaust - 30%
Project No: 30174.003.002

Operator: D. Allen
Date: 6/25/02

		Cal Gas Conc.	Direct Calibration Response ppm / %	Direct Calibration Response % Error	Post Test Run 1 Response ppm / %	Post Test Run 1 %Drift	Post Test Run 1 %Bias	Post Test Run 2 Response ppm / %	Post Test Run 2 %Drift	Post Test Run 2 %Bias	Post Test Run 3 Response ppm / %	Post Test Run 3 %Drift	Post Test Run 3 %Bias	Comments
			Time: 700		Time: 1520-1605			Time: 1642-1727			Time: 1800-1845			
	Zero	0	0.4	0.4	0.4			0.4			0.4			
NO_x	Low													
	Mid	448	444	442	441			441			443			
0-1000	High													
	Zero	0	0.4	0.4	0.2			0.3			0.2			
CO	Low													
	Mid	~~1494~~												
0-200	High	149.4	149	147	147			147			145			
THC	Zero	0	-0.2	6.7	5.9	(0.3)		5.8	(0.3)		5.1	(0.2)		
(meth)	Low													
	Mid	124.6	121	126	129	(116)		131	(115)		129	(115)		
0-300	High													
	Zero	0	-0.1	0.0	0.0			0.0			0.0			
O_2	Low													
	Mid													
	High	19.99	19.9	20.0	19.9			19.9			20.0			
CO_2	Zero	0	-0.2	-0.2	-0.1			-0.2			-0.2			
	Low													
	Mid	9.99	10.0	10.1	9.9			9.9			10.0			
	High													

CEM CALIBRATION DATA SHEET

Company: Elmendorf
Location: Gen. A 75%
Project No: 30174.0003.002

Operator: D. All--
Date: 6/26/02

		Cal Gas Conc.	Direct Calibration Response ppm / %	Direct Calibration Response % Error	Post Test Run 1 Response ppm / %	Post Test Run 1 Response %Drift	Post Test Run 1 Response %Bias	Post Test Run 2 Response ppm / %	Post Test Run 2 Response %Drift	Post Test Run 2 Response %Bias	Post Test Run 3 Response ppm / %	Post Test Run 3 Response %Drift	Post Test Run 3 Response %Bias	Comments
			Time: ~~[illegible]~~/1000		Time: 1033-1118			Time:			Time:			
	Zero	0												
NOx	Low													
	Mid	448												
0-1000	High	885.5												
	Zero	0	0.4	0.6	0.3									
CO	Low	30.1		28.8										
	Mid	59.4		59.6										
0-200	High	149.4	149	154	155									
	Zero	0	-0.5	-1.3	5.0	(1.1)								
THC	Low	49.96		50.0	53.1	(46)								
(Meth)	Mid	124.6		127										
0-700	High	298.6	297	297										
	Zero	0		-0.2	-0.3									
O2	Low													
	Mid	10.56		10.5										
	High	19.99		19.9	19.7									
	Zero	0		-0.3	-0.4									
CO2	Low													
	Mid	9.99		10.0	9.8									
	High	20.53		20.2										

CEM CALIBRATION DATA SHEET

Company: Elmendorf AFB
Location: Gen-A 75%/100%
Project No: 30174.0003.002

Operator: D. Allen
Date: 6/27/02

		Cal Gas Conc.	Direct Calibration Response ppm / %	Direct Calibration Response % Error	Post Test Run 1 (100-1) Response ppm / %	Post Test Run 1 %Drift	Post Test Run 1 %Bias	Post Test Run 2 (100-2 & 100-3) Response ppm / %	Post Test Run 2 %Drift	Post Test Run 2 %Bias	Post Test Run 3 (75-2 & 75-3) Response ppm / %	Post Test Run 3 %Drift	Post Test Run 3 %Bias	Comments
			Time:		Time: 1020-1105			Time: 1220-1305			Time: 1522-1607			
	Zero	0	[illegible]	-0.1	[illegible]	0.0		3.0	[illegible]	5	10	Run 3 →	10	
NOx	Low													
	Mid	448	[illegible]	448	[illegible]	448		453	[illegible]	459	463	Run	464	
0-1000	High	885.5		885		886						← 2		
	Zero	0	0.6		0.6			0.6		0.6	0.6		0.6	
CO	Low	30.1	30.0											
	Mid	59.4	59.6											
0-200	High	149.4	149		149			148		147	147		146	
	Zero	0	0.3		4.4	(1)		3.6	(1)	3.6	4.3	(.5)(.5)	4.2	
THC	Low	49.96	49.6		~~47.8~~	(42.5)		47.0	(42)	47.1	46.4	(43)(41)	46.2	
	Mid	124.6	123							(0.5)				
0-300	High	298.6	298							(43)				
	Zero	0	-0.1		-0.1			-0.1		0.0	0.0		0.1	
O_2	Low													
	Mid	10.56	10.5											
	High	19.99	20.0		20.1			20.1		20.0	19.8		19.9	
	Zero	0	-0.1		-0.1			0.1		0.1	0.0		-0.1	
CO_2	Low													
	Mid	9.99	10.0		9.9			10.0		9.7	9.8		9.9	
	High	20.37	20.5											

Run 100-3 Time
1325-~~1410~~ 1355
1432-1447

Run 75-3 Time
1642-~~1727~~ 1656
1706-1787

CLIENT Elmendorf AFB
LOCATION Gen. A - 10, 25, 50%
SUBJECT 6/25/[illegible]

EQ

PN ______ Sheet No. ______
Checked By ______ Date ______
Computed By ______ Date ______

10%

Run	Time	NO	CO	THC	CO_2	O_2	Methane
1	730-815	177.8	125.2	99.4	3.2	16.3	1.4
2	0845-0930	170.5	117.5	102.4	3.2	16.4	1.4
3	1005-1050	172.3	113.3	95.1	3.2	16.4	1.4

25%

Run	Time	NO	CO	THC	CO_2	O_2	Methane
1	1125-1210	196.5	101.7	85.5	4.1	15.2	1.1
2	1245-1330	196.9	100.7	86.2	4.1	15.2	1.1
3	1400-1445	195.3	98.3	79.1	4.1	15.2	1.1

50%

Run	Time	NO	CO	THC	CO_2	O_2	Methane
1	1520-1605	299.3	113.1	71.2	5.8	12.9	0.7
2	1642-1727	306.6	111.6	72.9	5.9	12.8	0.8
3	1800-1845	316.3	116.3	60.8	6.0	12.7	0.6

CLIENT Elmendorf AFB

LOCATION Gen A ~~75~~/100%

SUBJECT 6/26/02

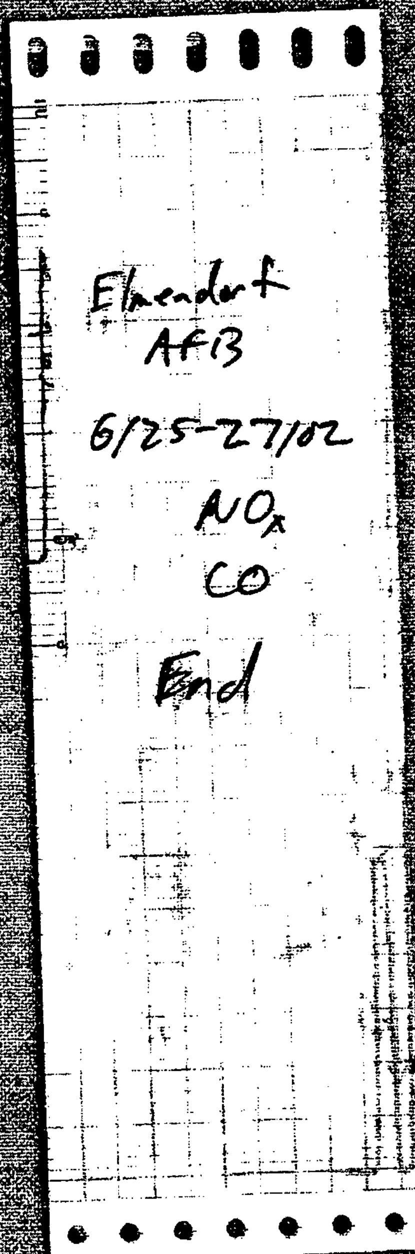
EQ

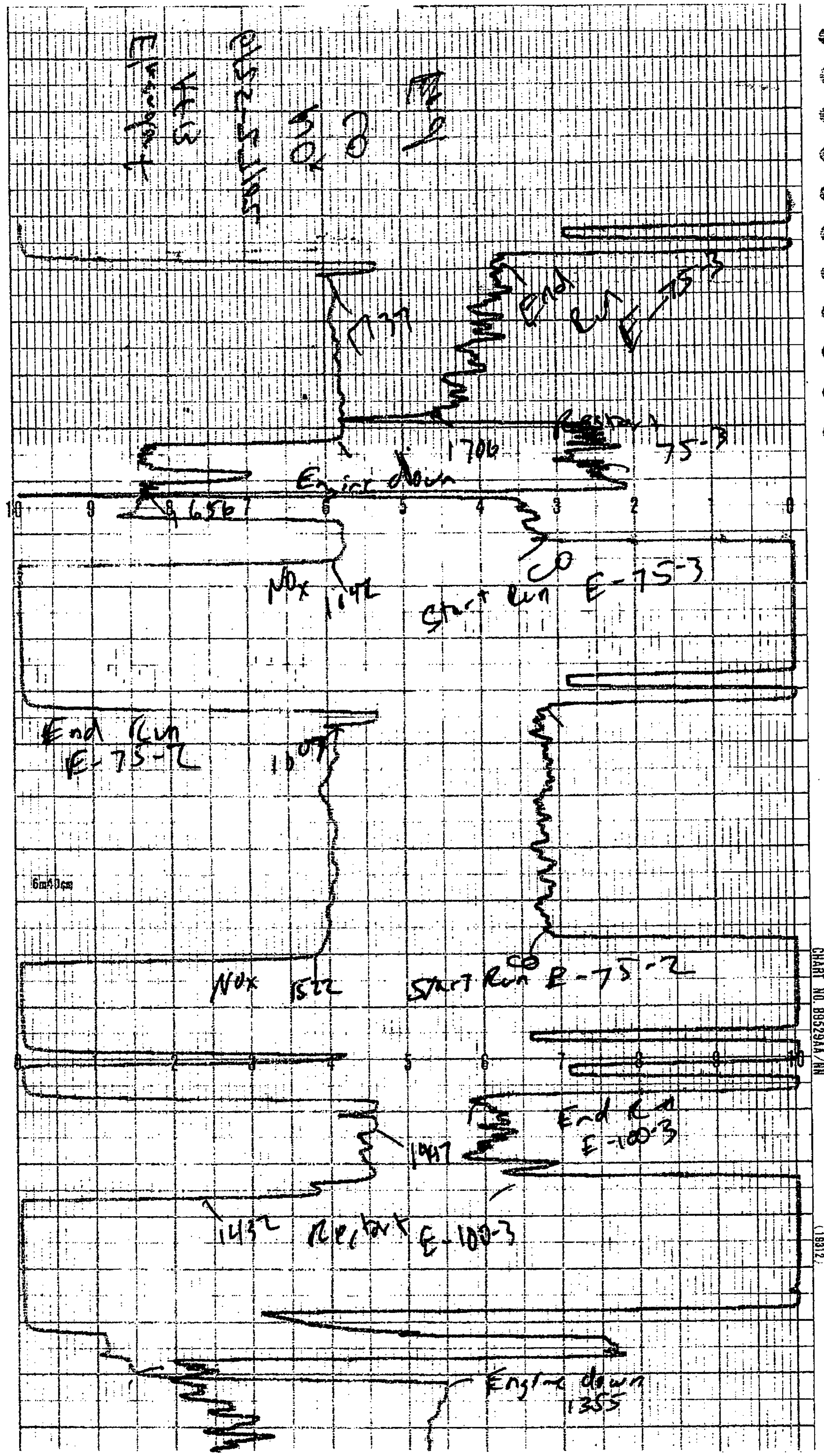
PN ____ Sheet No. ____

Checked By ____ Date ____

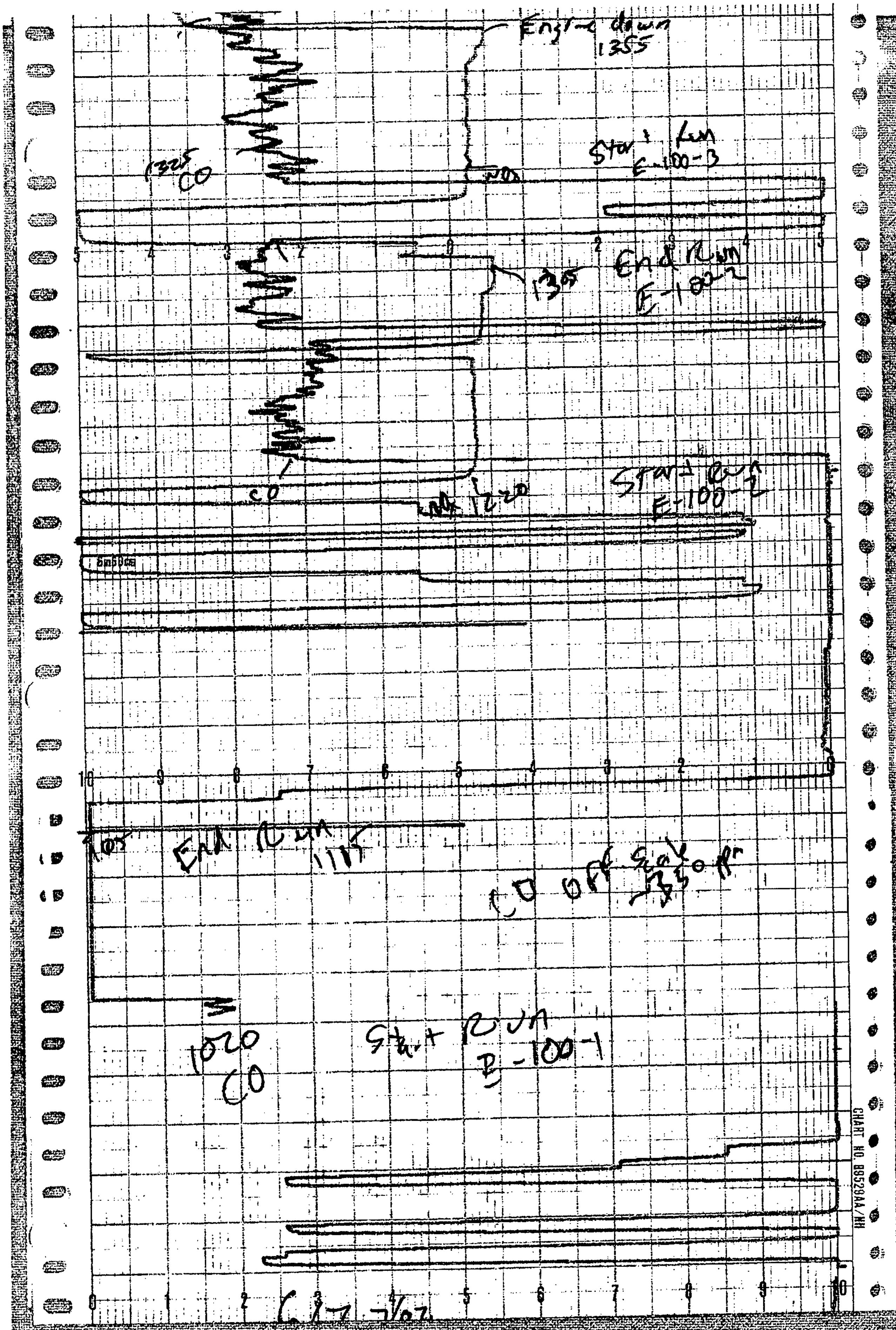
Computed By ____ Date ____

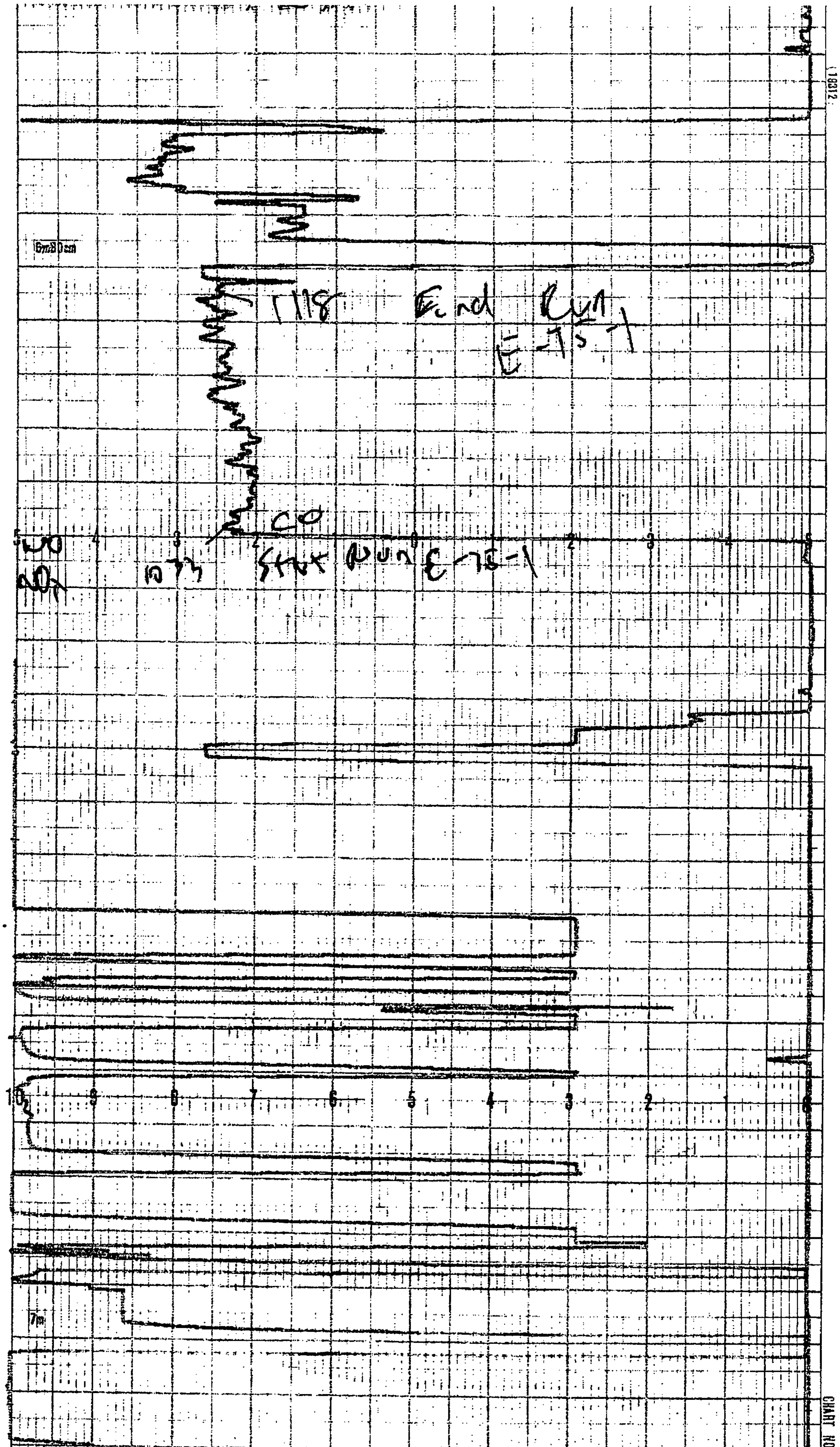
Run	Time	NOx	CO	THC	CO_2	O_2	Methane
E75-1	1033-1118	—	146.9	47.3	6.2	11.8	1.4
6/27/02							
E-100-1	1020-1105	—	325 (offscale)	40.2	6.9	11.4	1.5
E-100-2	1220-1305	511.8	347.8	39.0	7.0	11.6	1.6
E-100-3	1325-~~1410~~ 1355 1432-1447 Engine load ? 1355	493.8	314.0	46.3	6.8	11.3	1.4
E-75-2	1522-1607	401.2	162.5	54.7	6.6	12.0	1.1
E-75-3	1642-1656 Engine down 1706-1737 Restart	382.3	194.1	67.5	6.3	12.4	1.3

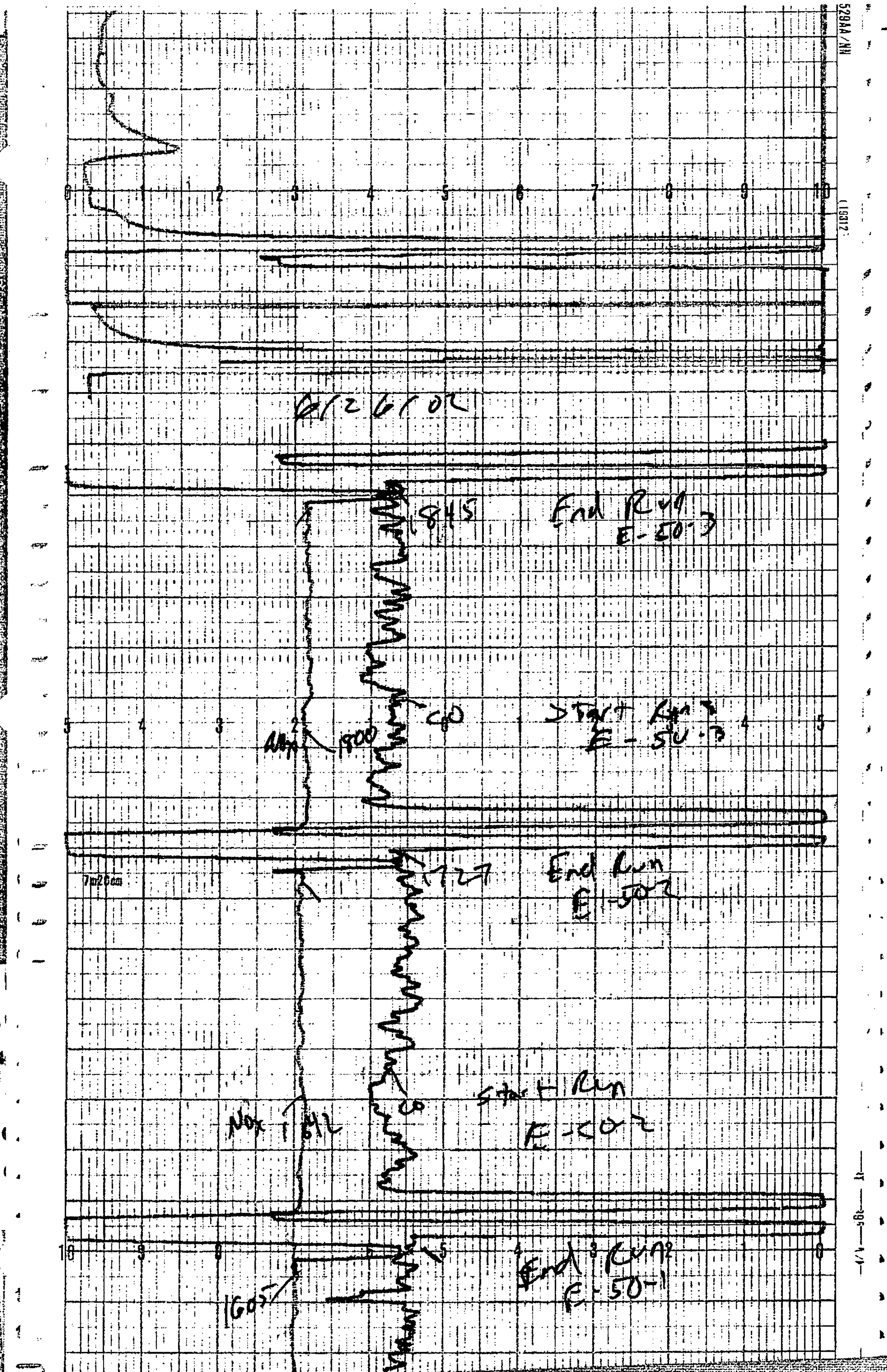

Elmendorf
AFB
6/25-27/02
NO_x
CO
End



End Run E-75-3
1737
1706
Restart 75-3
Engine down
1656
CO
NOx
1642
Start Run E-75-3
End Run E-75-2
1607
NOx
1522
Start Run E-75-2
End Run E-100-3
1447
1432
Restart E-100-3
Engine down
1355
CHART NO. B9529AA/NN
(19312)


Engine down 1355
1325 CO
Start Run E-100-3
1305 End Run E-100-2
CO
1220
Start Run E-100-2
End Run 1115
CO off
1020 CO
Start Run E-100-1
CHART NO. B5529AA/NH


18312
6m80cm
1118 End Run E-75-1
CO
1033 Start Run E-75-1
40
20
7m
CHART NO.



529AA/NN
6/26/02
1845
End Run
E-50-3
CO
Start Run
E-50-3
1800
1727
End Run
E-50-2
7m20cm
CO
Start Run
E-50-2
NOx 1642
1605
End Run
E-50-1

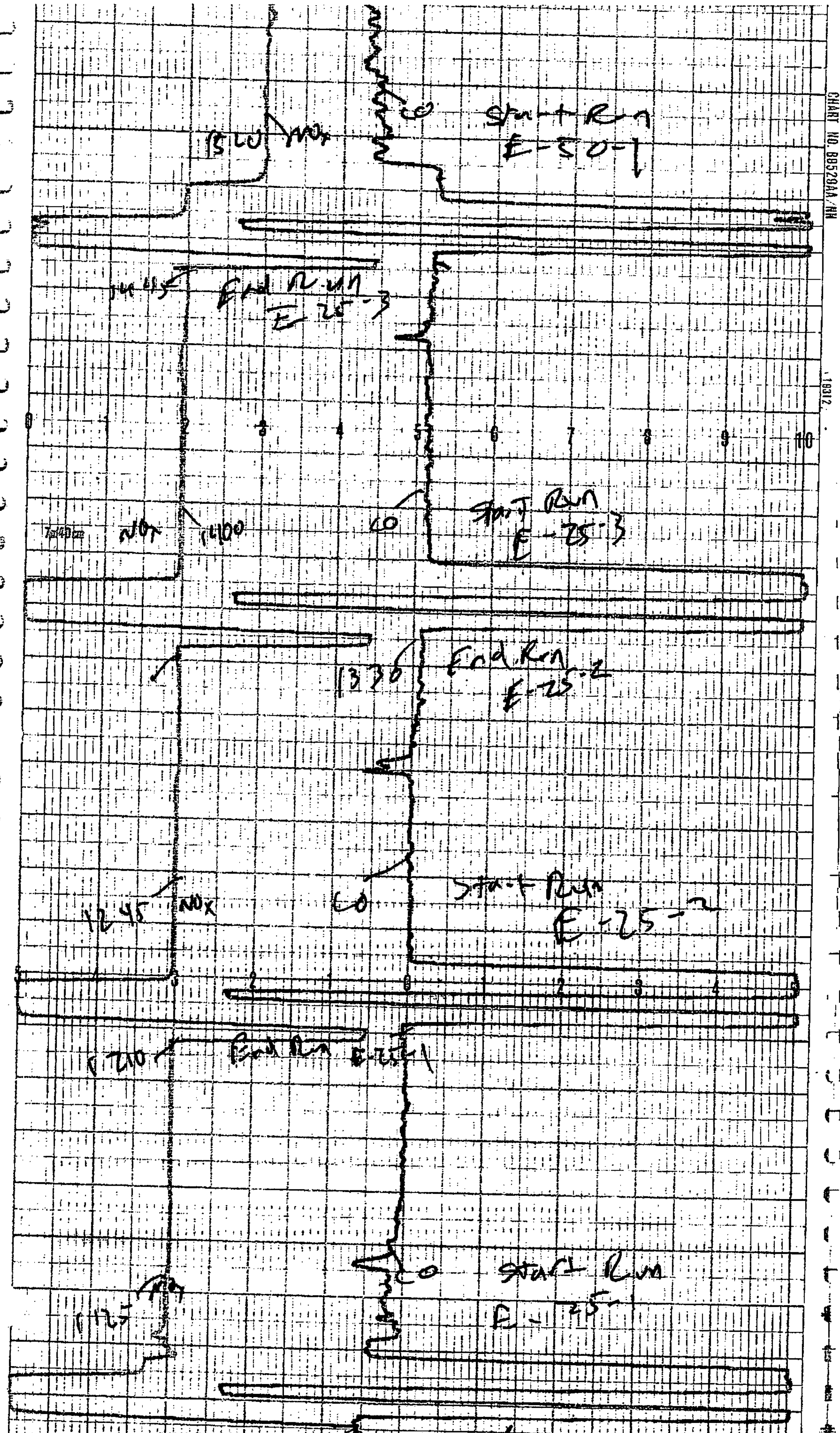
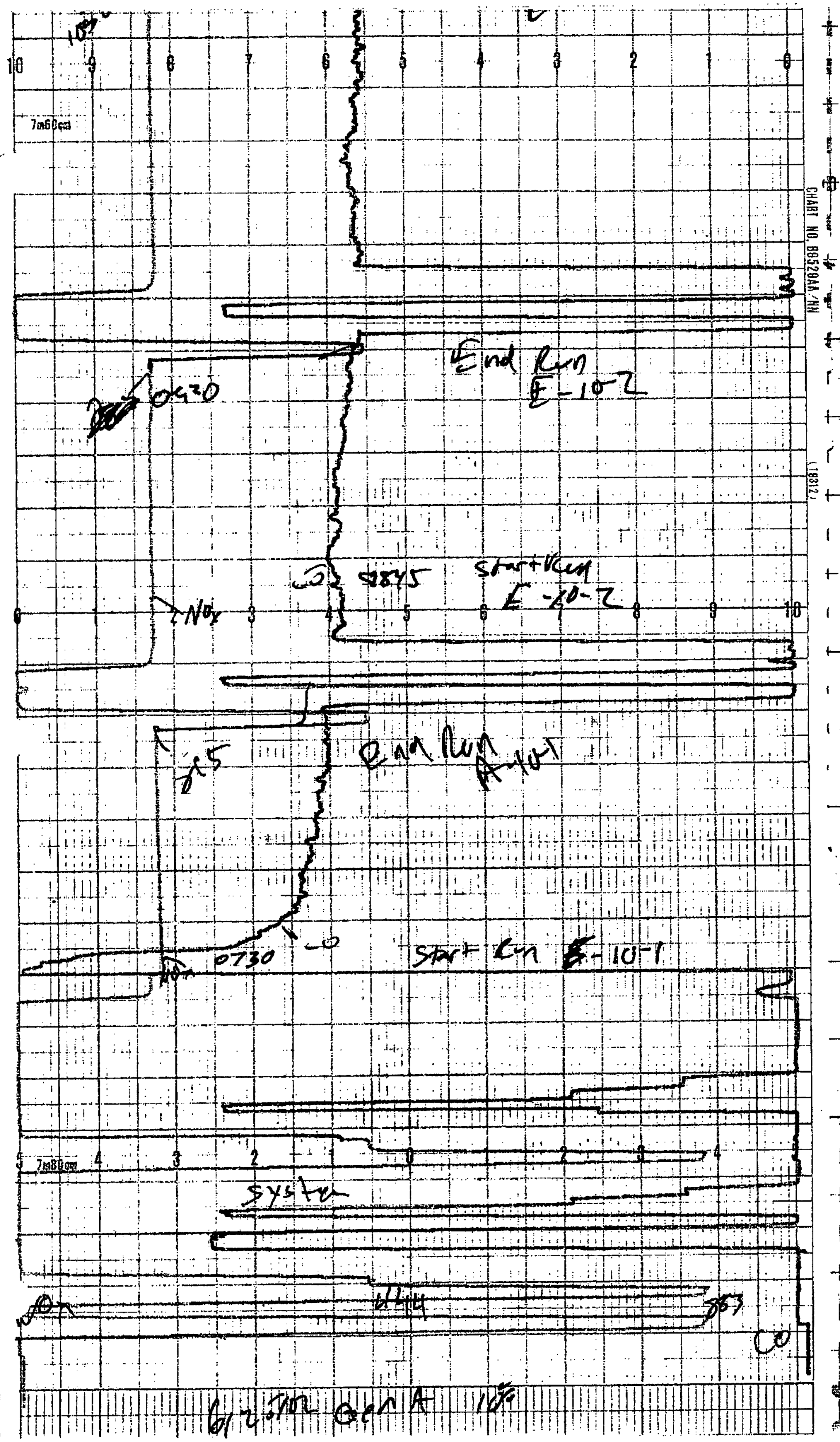


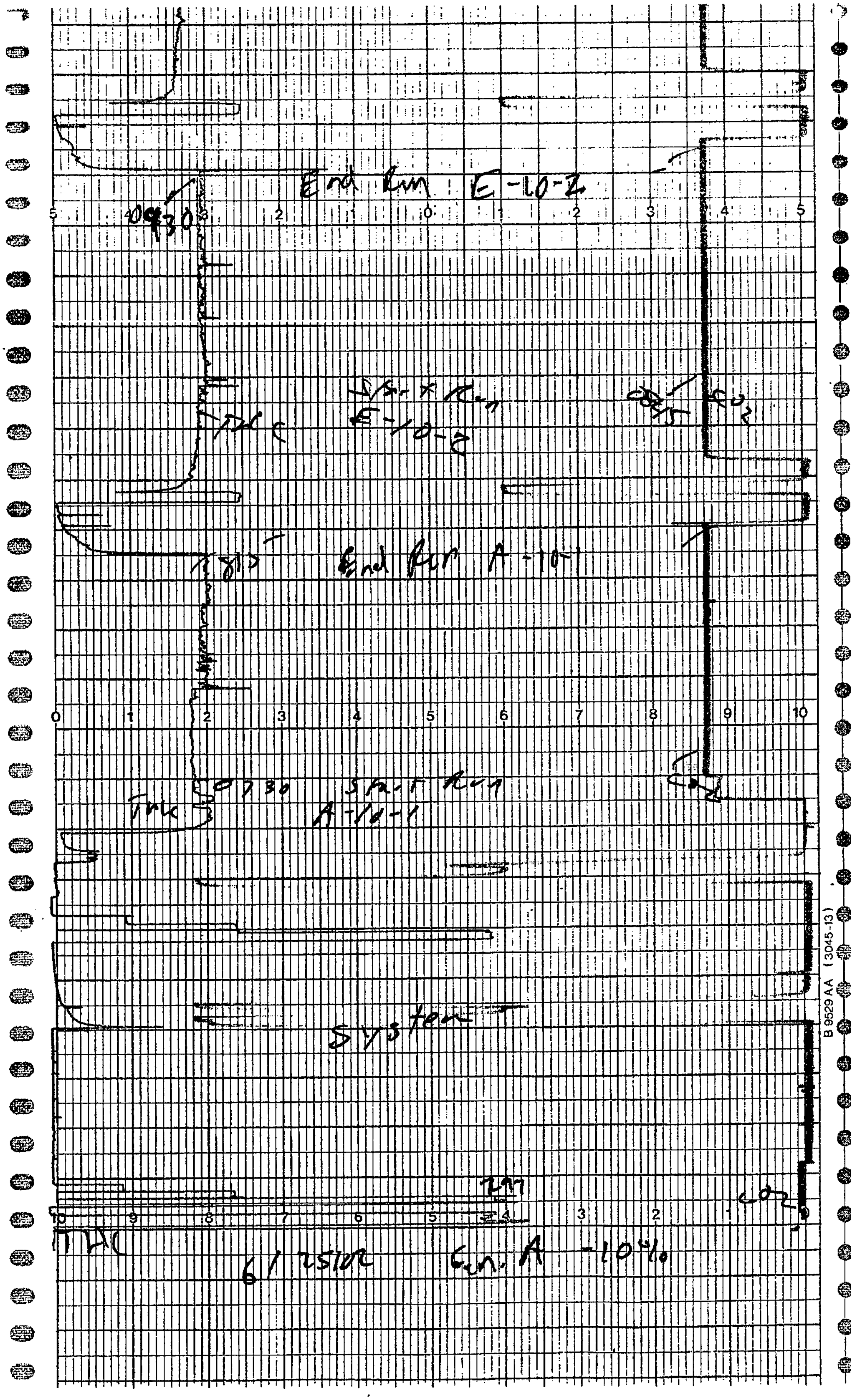
CHART NO. BB529AA-HH
1350
NOx
CO
Start Run
E-50-1
1445
End Run
E-25-3
0
2
3
4
5
6
7
8
9
10
NOx
1400
CO
Start Run
E-25-3
1330
End Run
E-25-2
1245
NOx
CO
Start Run
E-25-2
1210
End Run E-25-1
CO
Start Run
E-25-1
1125
NOx

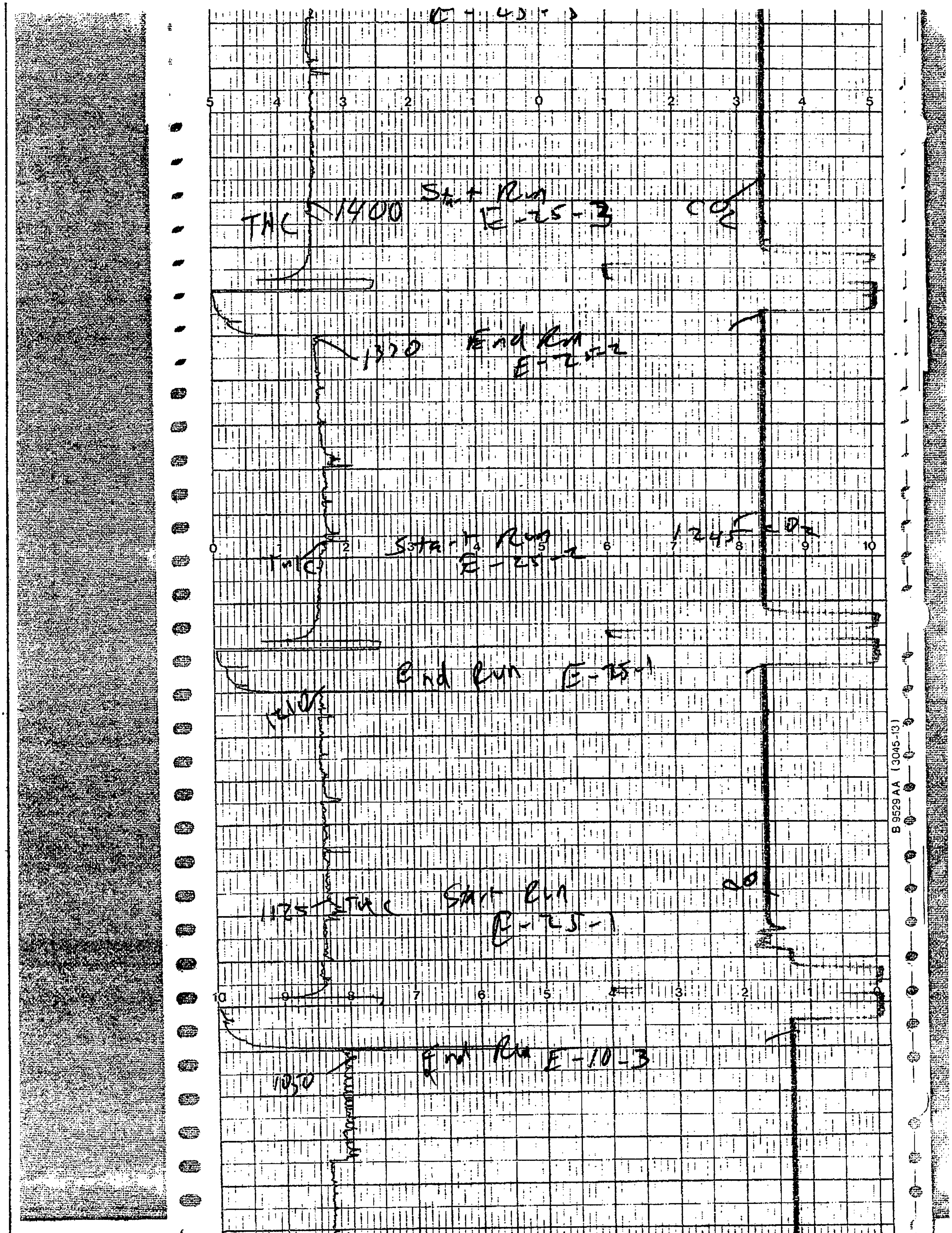


7m60cm
End Run E-10-2
0420
0845
Start Run E-10-2
NOx
End Run
0730
Start Run E-10-1
7m80cm
System
CO
Gen A
CHART NO. 8852AA/NN

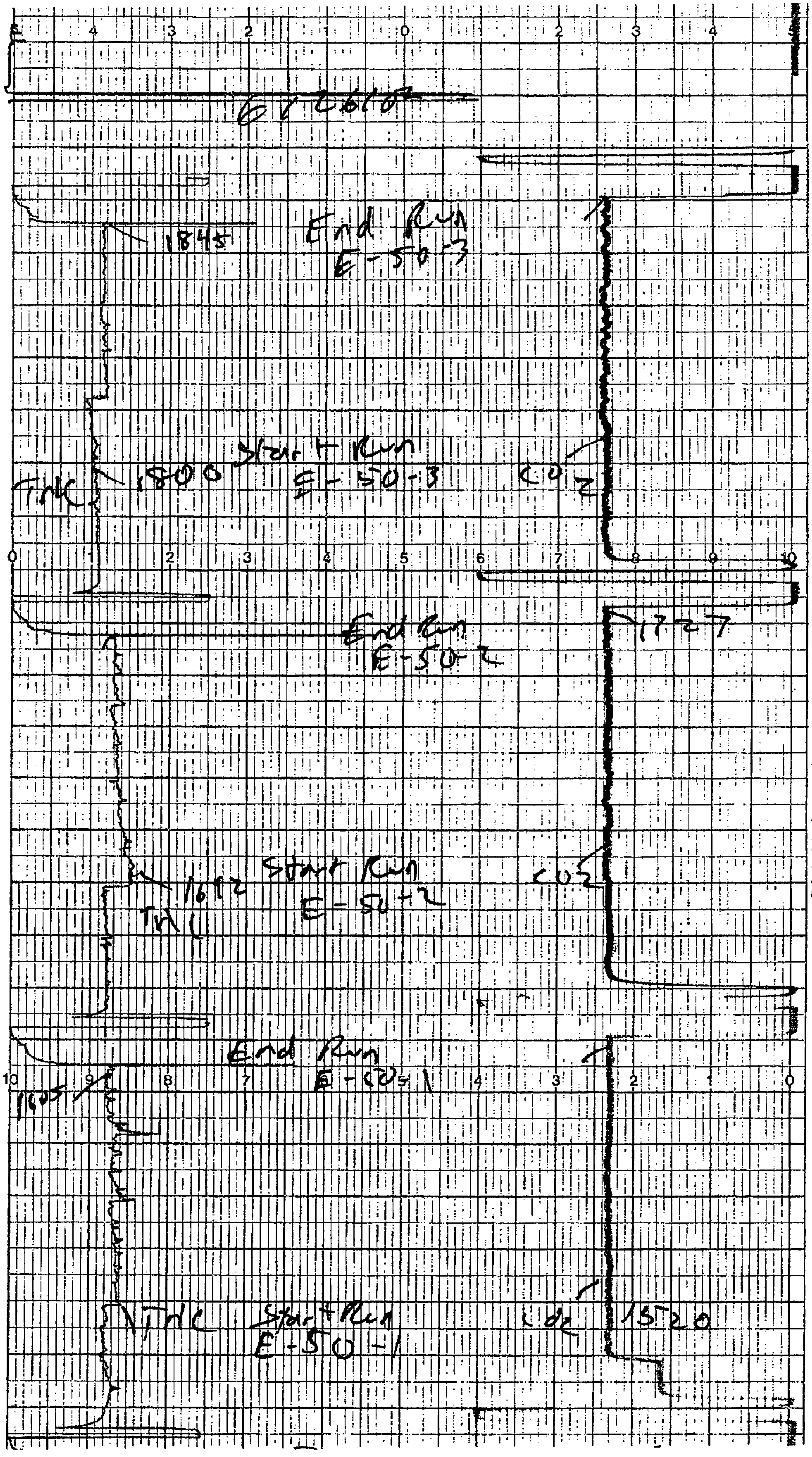
Elmendorf
AFB
6/25-27/02
THC
CO_2

End

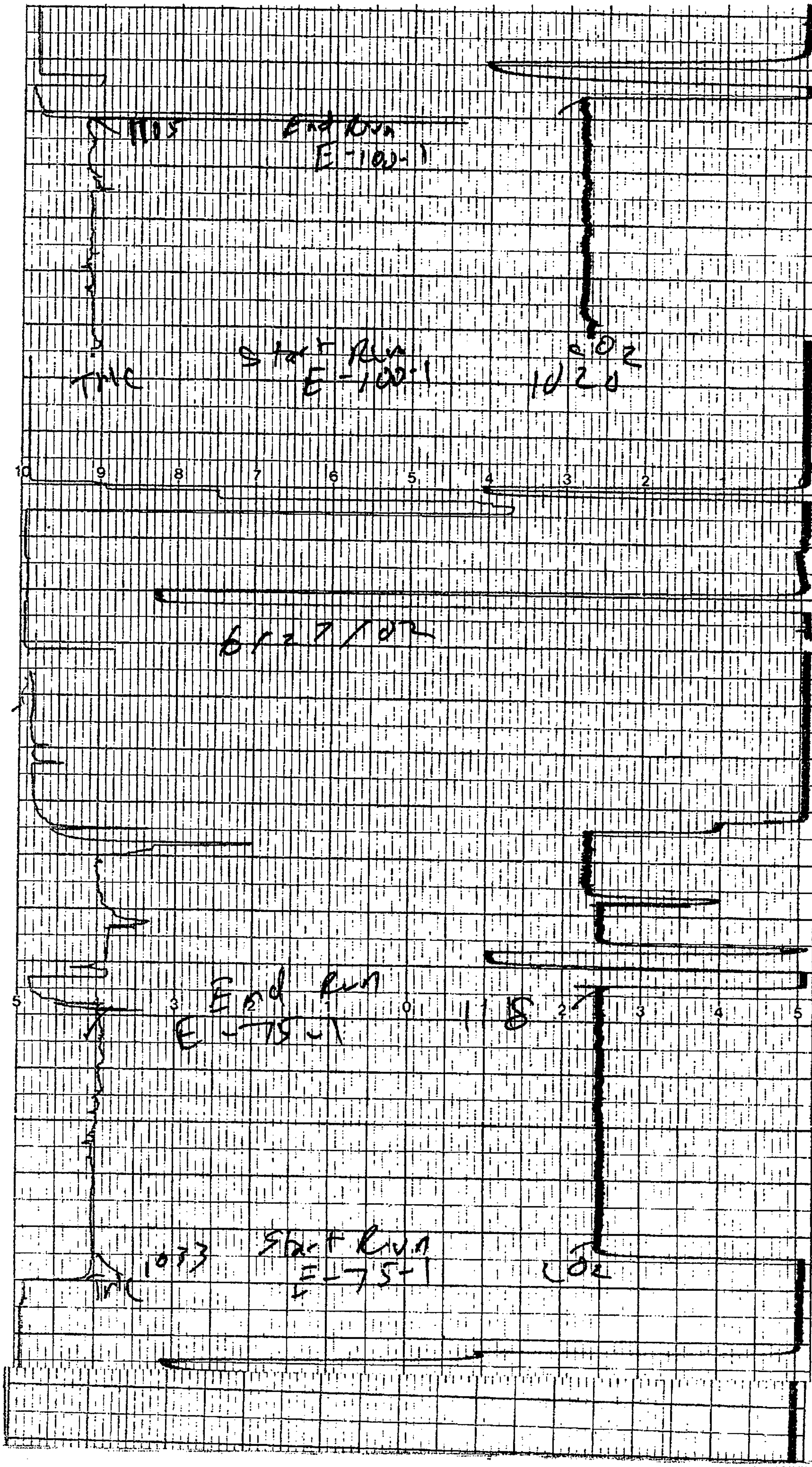

End Run E-10-2
0930
Start Run E-10-2
THC
CO2
0815
End Run A-10-1
0730 Start Run A-10-1
THC
System
CO2
THC
6/25/02
A -10%
B 9529 AA (3045-13)

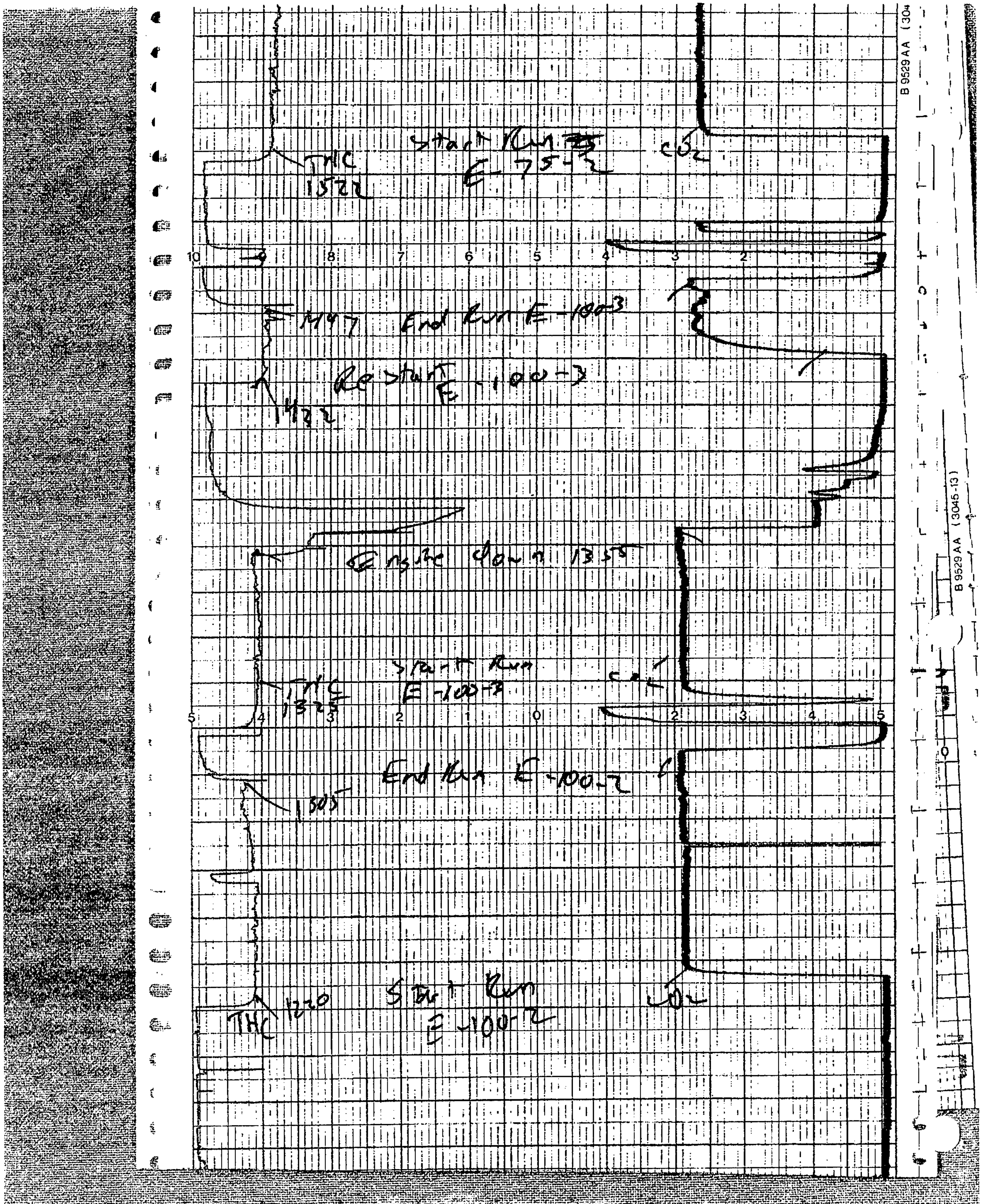


E-4D-3
THC 1400
Start Run
E-25-3
CO2
1330
End Run
E-25-2
Start Run
E-25-2
THC
1245
O2
1310
End Run E-25-1
1125 THC
Start Run
E-25-1
O2
1030
End Run E-10-3
B 9529 AA (3045-13)



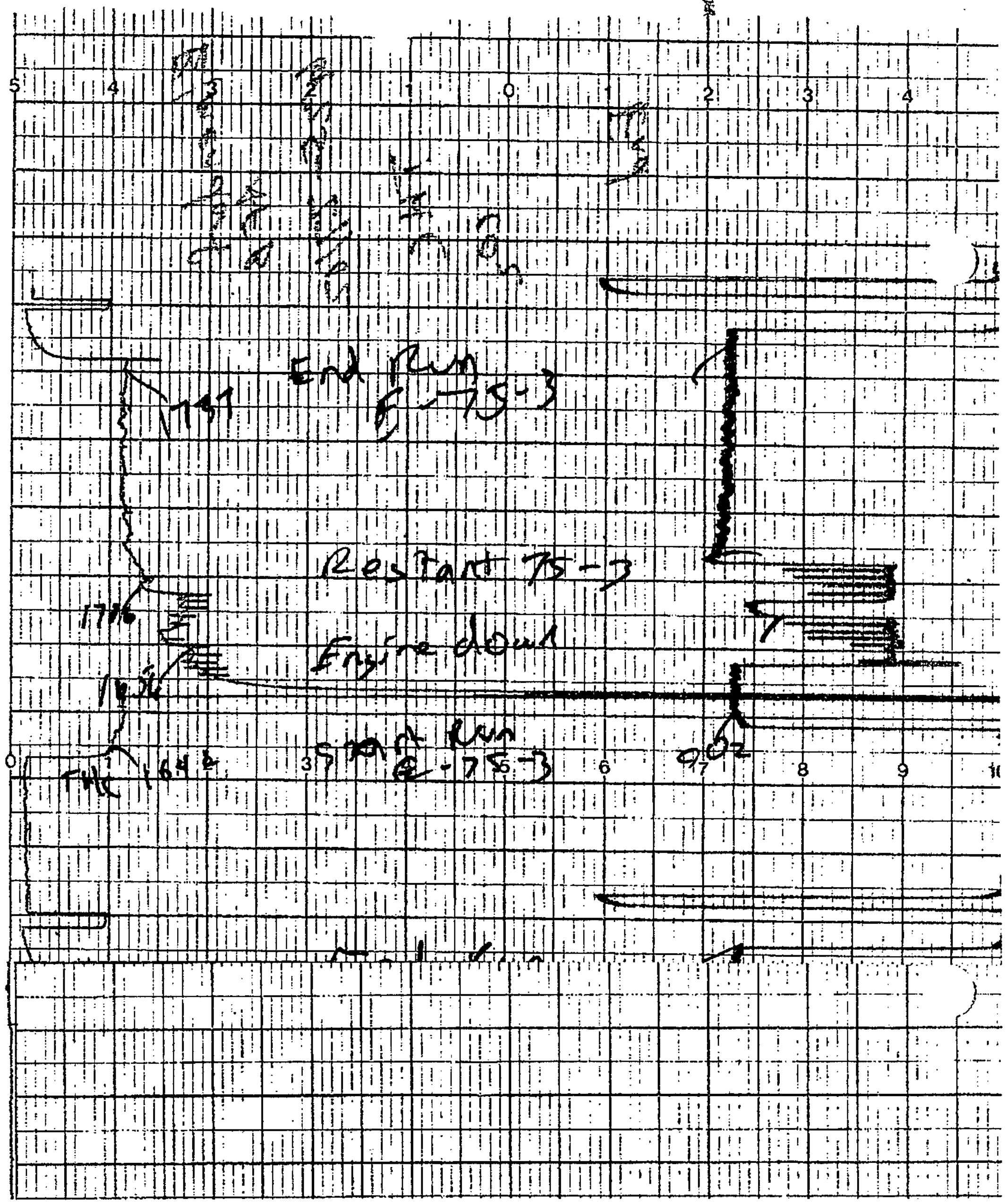
B 9529 AA (3045-13)


1105
End Run
E-100-1
Start Run
E-100-1
THC
O2
1020
6/27/02
End Run
E-75-1
1118
1033
Start Run
E-75-1
THC
O2
B 9529 AA (3045-13)


THC 1522
Start Run E-75-2
CO2
1447 End Run E-100-3
Restart E-100-3
1432
Engine down 1355
THC 1325
Start Run E-100-2
CO2
End Run E-100-2
1305
THC 1220
Start Run E-100-2
CO2
B 9529 AA (3045-13)

1302 End Run E-100-5

1352 E-100-3
Start Run



APPENDIX D

ANALYTICAL RESULTS

Environmental Quality Management, Inc.

Travis and Elmendorf

PROJECT ANALYTICAL SHEET (sheet 1 of 3)					
Project Name: AF Generator Testing			Project No.: 030174.0003.002		
Project Date(s): June 2002			Project Manager: Tom Gerstle		
Method(s): Method 5			No. of Sites: 2 - 5 settings Each		

TRAVIS

RUN NO.	ID NO.	#/DESCRIPTION	TARE MASS	FINAL MASS	NET MASS
T-5-10-1	02210	830244	264.75	286.3	21.55
T-5-10-1	02211	320	114367.4	114372.55	5.15
T-5-10-2	02212	PC 011	54.8	127.5	72.7
T-5-10-2	02213	317	113999.4	114004.25	4.85
T-5-10-3	02214	830246	264.5	292.8	28.3
T-5-10-3	02215	309	110840.25	110847.5	7.25
T-5-25-1	02216	830245	265.75	290.9	25.15
T-5-25-1	02217	319	115346.5	115351.9	5.4
T-5-25-2	02218	PC 018	54.3	171.45	117.15
T-5-25-2	02219	307	1068662.2	1068668.1	5.9
T-5-25-3	02220	830303	267.2	297.05	29.85
T-5-25-3	02221	310	114523.85	114532.0	8.15
T-5-50-1	02222	830247	262.95	283.0	20.05
T-5-50-1	02223	306	111145.1	111150.4	5.3
T-5-50-2	02224	PC 028	54.05	120.7	66.65
T-5-50-2	02225	314	113409.55	113414.6	5.05
T-5-50-3	02226	830304	264.55	287.55	23.0
T-5-50-3	02227	316	114667.4	114674.1	6.7
T-5-75-1	02228	830224	263.35	289.8	26.45
T-5-75-1	02229	313	111917.25	111924.1	6.85
T-5-75-2	02230	PC 027	54.2	158.25	104.05
T-5-75-2	02231	315	113834.1	113841.8	7.7
T-5-75-3	02232	830243	263.55	292.5	28.95

EQ Environmental Quality Management, Inc.

TRAVIS

PROJECT ANALYTICAL SHEET (sheet 2 of 3)

RUN NO.	ID NO.	#/DESCRIPTION	TARE MASS	FINAL MASS	NET MASS
T-5-75-3	02233	318	115677.5	115687.2	9.7
T-5-100-1	02234	830248	264.4	288.45	24.05
T-5-100-1	02235	312	107651.0	107660.05	9.05
T-5-100-2	02236	PC015	54.3	150.15	95.85
T-5-100-2	02237	308	112824.6	112831.95	7.35
T-5-100-3	02238	830229	263.8	287.95	24.15
T-5-100-3	02239	311	107376.25	107384.1	7.85
ELMENDORF E-5-10-1	02240	830228	263.6	271.15	7.55
E-5-10-1	02241	325	113523.65	113527.25	3.6
E-5-10-2	02242	PC014	55.25	119.75	64.5
E-5-10-2	02243	324	114579.3	114582.65	3.35
E-5-10-3	02244	830225	265.55	273.1	7.55
E-5-10-3	02245	322	114501.2	114504.25	3.05
E-5-25-1	02246	830226	262.8	273.0	10.2
E-5-25-1	02247	321	116085.1	116088.95	3.85
E-5-25-2	02248	PC024	53.95	123.20	69.2
E-5-25-2	02249	327	113285.35	113289.55	4.2
E-5-25-3	02250	830231	263.6	276.8	13.2
E-5-25-3	02251	329	105497.8	105502.55	4.75
E-5-50-1	02252	830230	263.8	291.05	27.25
E-5-50-1	02253	328	110180.55	110186.05	5.50
E-5-50-2	02254	PC021	53.8	208.95	155.15
E-5-50-2	02255	323	115847.4	115854.7	7.3
E-5-50-3	02256	830227	264.3	289.0	24.7
E-5-50-3	02257	326	115010.65	115016.45	5.8
E-5-75-1	02258	830219	265.6	288.7	23.1
E-5-75-1	02259	211	111767.9	111775.05	7.15

N:\Air Testing\Forms\Sample Forms\Project Analytical Sheet #2.doc

EQ Environmental Quality Management, Inc

PROJECT ANALYTICAL SHEET (sheet 3 of 3)					
RUN NO.	ID NO.	#/DESCRIPTION	TARE MASS	FINAL MASS	NET MASS
E-5-75-2	02260	PC 020	54.75	133.0	78.25
E-5-75-2	02261	205	109311.65	109320.3	8.65
E-5-75-3	02262	830310	262.15	291.3	29.15
E-5-75-3	02263	206	111628.2	111636.05	7.85
E-5-100-1	02264	830311	263.35	307.6	44.25
E-5-100-1	02265	199	110359.6	110370.4	10.8
E-5-100-2	02266	PC 022	54.2	94.4	40.2
E-5-100-2	02267	200	112018.2	112030.65	12.45
E-5-100-3	02268	830312	262.6	299.7	37.1
E-5-100-3	02269	198	114292.85	114303.5	10.65
BLANK	02-271	PC 023 FILTER	54.15	55.3	1.15
BLANK	02-270	830305 TD ~~PE~~ FILTER	264.65	264.85	0.2
BLANK	02-272	ACETONE			

First Analytical Laboratories

ANALYSIS REPORT

Method 202: Condensible Particulate

Project # 030174.0003.002

86 Generator Testing

Prepared for:

Environmental Quality Management
1800 Carillon Blvd.
Cincinnati, OH 45240

Reviewed and Approved by:

WHWadl

William H. Wadlin, Ph. D.
Laboratory Manager

July 25, 2002

First Analytical Laboratories

CASE NARRATIVE

Project #: 20710 Report Date: 25-Jul-02
Client: Environmental Quality Management
Client Project ID: 030174.0003.002

Samples:

Thirty-one sets of Method 202 samples were submitted for determination of condensible particulate. All of the samples were received in good condition with no apparent leakage or damage.

Results:

The results are given in total milligrams for each fraction. For each subset, the aqueous fraction was greater than the organic fraction.

First Analytical Laboratories
1126 Burning Tree Dr. Chapel Hill, NC 27517
Tel. (919) 942-8607
FAX (919) 929-8688
www.firstanalyticallabs.com

ANALYSIS REPORT

CONDENSIBLE PARTICULATE WEIGHT

Project #: 20710
Client: Environmental Quality Management
Client Project ID: 030174.0003.002

Report Date: 25-Jul-02
Date Received: 16-Jul-02

Sample ID Client	FAL	Tare Weight g	Final Weight g	Particulate Weight mg
ORGANIC FRACTION				
T-10-5-1	20710.T101	4.3411	4.3503	9.2
T-10-5-2	20710.T102	4.3333	4.3418	8.5
T-10-5-3	20710.T103	4.3281	4.3365	8.4
T-25-5-1	20710.T251	4.3484	4.3571	8.7
T-25-5-2	20710.T252	4.3754	4.3805	5.1
T-25-5-3	20710.T253	4.3594	4.3618	2.4
T-50-5-1	20710.T501	4.3347	4.3371	2.4
T-50-5-2	20710.T502	4.3631	4.3677	4.6
T-50-5-3	20710.T503	4.3713	4.3729	1.6
T-75-5-1	20710.T751	4.3213	4.3258	4.5
T-75-5-2	20710.T752	4.3131	4.3165	3.4
T-75-5-3	20710.T753	4.3195	4.3242	4.7
T-100-5-1	20710.T1001	4.3232	4.3250	1.8
T-100-5-2	20710.T1002	4.3801	4.3835	3.4
T-100-5-3	20710.T1003	4.3776	4.3796	2.0
E-10-5-1	20710.E101	4.3421	4.3526	10.5
E-10-5-2	20710.E102	4.3201	4.3267	6.6
E-10-5-3	20710.E103	4.3869	4.3920	5.1
E-25-5-1	20710.E251	4.3842	4.3912	7.0
E-25-5-2	20710.E252	4.4125	4.4179	5.4
E-25-5-3	20710.E253	4.4007	4.4071	6.4
E-50-5-1	20710.E501	4.3681	4.3765	8.4
E-50-5-2	20710.E502	4.3646	4.3675	2.9
E-50-5-3	20710.E503	4.3341	4.3427	8.6
E-75-5-1	20710.E751	4.3537	4.3606	6.9
E-75-5-2	20710.E752	4.3478	4.3509	3.1
E-75-5-3	20710.E753	4.3803	4.3866	6.3
E-100-5-1	20710.E1001	4.3682	4.3742	6.0
E-100-5-2	20710.E1002	4.3716	4.3746	3.0
E-100-5-3	20710.E1003	4.3550	4.3593	4.3
MeCl2 Blank	20710.OB	4.3786	4.3785	-0.1

First Analytical Laboratories
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Tel. (919) 942-8607
FAX (919) 929-8688
www.firstanalyticallabs.com

ANALYSIS REPORT

CONDENSIBLE PARTICULATE WEIGHT

Project #: 20710
Client: Environmental Quality Management
Client Project ID: 030174.0003.002

Report Date: 25-Jul-02
Date Received: 16-Jul-02

Sample ID Client	FAL	Particulate Weight mg
TOTALS		
T-10-5-1	20710.T101	27.9
T-10-5-2	20710.T102	28.4
T-10-5-3	20710.T103	26.0
T-25-5-1	20710.T251	30.6
T-25-5-2	20710.T252	21.8
T-25-5-3	20710.T253	21.4
T-50-5-1	20710.T501	19.0
T-50-5-2	20710.T502	26.3
T-50-5-3	20710.T503	18.8
T-75-5-1	20710.T751	31.3
T-75-5-2	20710.T752	24.2
T-75-5-3	20710.T753	27.8
T-100-5-1	20710.T1001	19.7
T-100-5-2	20710.T1002	20.8
T-100-5-3	20710.T1003	25.2
E-10-5-1	20710.E101	50.4
E-10-5-2	20710.E102	41.0
E-10-5-3	20710.E103	43.7
E-25-5-1	20710.E251	46.0
E-25-5-2	20710.E252	42.3
E-25-5-3	20710.E253	45.2
E-50-5-1	20710.E501	51.5
E-50-5-2	20710.E502	42.5
E-50-5-3	20710.E503	54.8
E-75-5-1	20710.E751	53.0
E-75-5-2	20710.E752	58.4
E-75-5-3	20710.E753	63.9
E-100-5-1	20710.E1001	56.2
E-100-5-2	20710.E1002	43.2
E-100-5-3	20710.E1003	50.0
Blank	20710.B	0.5

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ANALYSIS REPORT

CONDENSIBLE PARTICULATE WEIGHT

Project #: 20710
Client: Environmental Quality Management
Client Project ID· 030174.0003 002

Report Date: 25-Jul-02
Date Received: 16-Jul-02

Sample ID Client	FAL	Tare Weight g	Final Weight g	Particulate Weight mg
AQUEOUS FRACTION				
T-10-5-1	20710.T101	8.1951	8 2138	18 7
T-10-5-2	20710 T102	8.1059	8.1258	19 9
T-10-5-3	20710 T103	8 1939	8.2115	17.6
T-25-5-1	20710.T251	8.1637	8 1856	21.9
T-25-5-2	20710 T252	8.0513	8.0680	16.7
T-25-5-3	20710.T253	8.0263	8.0453	19.0
T-50-5-1	20710.T501	8.0466	8.0632	16.6
T-50-5-2	20710.T502	8 0893	8.1110	21.7
T-50-5-3	20710.T503	8 0716	8 0888	17.2
T-75-5-1	20710 T751	8 1806	8.2074	26.8
T-75-5-2	20710.T752	8.1983	8 2191	20.8
T-75-5-3	20710 T753	8.1878	8.2109	23.1
T-100-5-1	20710.T1001	8.2184	8.2363	17 9
T-100-5-2	20710.T1002	8.2686	8.2860	17.4
T-100-5-3	20710.T1003	8.0892	8.1124	23.2
E-10-5-1	20710.E101	8 1324	8 1723	39.9
E-10-5-2	20710 E102	8.1081	8.1425	34.4
E-10-5-3	20710.E103	8 0554	8 0940	38.6
E-25-5-1	20710 E251	8.0203	8.0593	39 0
E-25-5-2	20710.E252	8.1316	8.1685	36.9
E-25-5-3	20710 E253	8.2280	8.2668	38 8
E-50-5-1	20710 E501	8.2735	8.3166	43.1
E-50-5-2	20710 E502	8.2940	8.3336	39.6
E-50-5-3	20710 E503	8.1731	8.2193	46.2
E-75-5-1	20710.E751	8 2505	8.2966	46.1
E-75-5-2	20710.E752	8.0501	8 1054	55.3
E-75-5-3	20710 E753	8.0393	8 0969	57.6
E-100-5-1	20710 E1001	8.0570	8.1072	50 2
E-100-5-2	20710.E1002	8.2553	8 2955	40.2
E-100-5-3	20710.E1003	8 1399	8 1856	45 7
DI H2O Blank	20710.AB	8.0834	8.0839	0 5

Environmental Quality Management, Inc.

EQ Environmental Quality Management, Inc.

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Reference Document No. ____
Page 1 of ____

Project Name: 86 Generator Testing
Project Number: 030174.0003.002
Project Manager: Tom Gerstle
Sample Team Leader: Ron Kolde

Lab Destination: First Analytical
Lab Contact/Phone: Bill Wadlin
Lab Purchase Order No. ____
Carrier/Waybill No. ____

Report to: Ron Kolde, EQ, 1800 Carillon Blvd, Cincinnati Oh 45240
Bill to: Same

ONE CONTAINER PER LINE

Sample Number	Sample Description/Type	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Analytical Method/(Parameters)	Condition of Receipt (Lab)
T-10-5-1	MeCl2 rinse;		Glass/	UNK	N/A	EPA Method 202	
T-10-5-2	DI H2O Back ½		Plastic			for Condensible	
T-10-5-3	for each					Particulate Matter	
T-25-5-1	sample						
T-25-5-2							

Special Instructions: 2 Fractions for each test run - MeCl2 rinse + DI H2O Back ½

Possible Hazard Identification: Non-hazard ☐ Flammable ☐ Skin Irritant ☒ Other ____

Sample Disposal: Return to Client ☐ Disposal by Lab ☒ Archive 3 (mos.)

Turnaround Time Required: Normal ☒ Rush ☐ Results Required by ____

QA Requirements: per EPA Method 202

1. Relinquished by (Signature/Affiliation): Ron Kolde EQ Date: 7/14/02 Time: ____
1. Received by (Signature/Affiliation): W Wadlin FAL Date: 7/16/02 Time: ____

2. Relinquished by (Signature/Affiliation): ____ Date: ____ Time: ____
2. Received by (Signature/Affiliation): ____ Date: ____ Time: ____

Comments:

Environmental Quality Management, Inc.

ANALYSIS REQUEST AND CHAIN OF COUSTODY RECORD (cont.)

Reference Document No. ____

Page 2 of 3

Project Name 86 Generator Testing

Project No. 030174.0003.002

Sample Shipment Date 7/15/02

ONE CONTAINER PER LINE

Sample Number	Sample Description/Type	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Analytical Method/(Parameters)	Condition on Receipt (Lab)
T-25-5-3	MeCl2 rinse;		Glass/	UNK	N/A	EPA Method 202	
T-50-5-1	DI H2O Back ½		Plastic			For Condensible	
T-50-5-2	For each					particulate	
T-50-5-3	Sample run					matter	
T-75-5-1							
T-75-5-2							
T-75-5-3							
T-100-5-1							
T-100-5-2							
T-100-5-3							
MeCl2 Blank							
DI H2O Blank							
E-10-5-1							
E-10-5-2							
E-10-5-3							
E-25-5-1							
E-25-5-2							
E-25-5-2							
E-50-5-1							

Environmental Quality Management, Inc.

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD (cont.)

Reference Document No. ____________

Page 3 of 3

Project Name 86 Generator Testing

Project No. 030174.0003.002

Sample Shipment Date 7/15/02

ONE CONTAINER PER LINE

Sample Number	Sample Description/Type	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Analytical Method/(Parameters)	Condition on Receipt (Lab)
E-50-5-2	$MeCl_2$ rinse;		Glass/	UNK	NA	EPA Method 202	
E-50-5-3	① $I\ H_2O$ Back ½		Plastic			for condensible	
E-75-5-1	for each sample					particulate matter	
E-75-5-2							
E-75-5-3							
E-100-5-1							
E-100-5-2							
E-100-5-3							

MVA, Inc.
Excellence in
Microanalysis

12 September 2002

Environmental Quality Management
1800 Carillon Blvd
Cincinnati, OH 45240
Attention: Mr. Ronald Kolde

Re: Particle Sizing, EQM #30174.0003.002
MVA Project No. 5228

Dear Mr. Kolde:

Enclosed please find a report of the particle size analysis of the ten particulate samples and one blank received from your office by MVA, Inc. on August 22, 2002. These samples were sent in regard to your Air Force Project USAF Travis/Elmendorf. A Lab Purchase Order No. 4446 accompanied the samples.

Your samples will be held at MVA, Inc. for 30 days from the above date. After that date we will dispose of the samples if we have not been advised in writing that they should be returned.

Please call me at 770-662-8509 if you have any questions.

Sincerely,

James R. Millette

James R. Millette, Ph.D.
Executive Director

Enclosure

L:PROJECTS:MVA5228:RP091202

Report of Results -- MVA Project No. 5228

Particle Sizing, EQM #30174.0003.002
USAF Travis/Elmendorf
Purchase Order No. 4446

For:

Environmental Quality Management
1800 Carillon Blvd
Cincinnati, OH 45240
Attention: Mr. Ronald Kolde

By:

MVA, Inc.
5500 Oakbrook Parkway, Suite 200
Norcross, GA 30093

12 September 2002

L:PROJECTS:MVA5228:RP091202

MVA, Inc.
Excellence in Microanalysis

5500 Oakbrook Parkway #200
Norcross, GA 30093
770-662-8509 • FAX 770-662-8532
www.mvainc.com

Report of Results -- MVA Project No. 5228

Particle Sizing, EQM #30174.0003.002
USAF Travis/Elmendorf

INTRODUCTION

Ten particulate samples and a blank on polycarbonate filters were received from Environmental Quality Management by MVA, Inc. on August 22, 2002. These samples were sent in regard to Air Force Project USAF Travis/Elmendorf with a request for particle size distribution by electron microscopy and information on particle morphology and qualitative description of the particles.

In the laboratory, samples were assigned MVA numbers as follows:

MVA #	Description
M3438	PC011, T-5-10-2, filter with black soot
M3439	PC018, T-5-25-2, filter with black soot
M3440	PC028, T-5-50-2, filter with black soot
M3441	PC027, T-5-75-2, filter with black soot
M3442	PC015, T-5-100-2, filter with black soot
M3443	PC014, E-10-5-2, filter with black soot
M3444	PC224, E-25-5-2, filter with black soot
M3445	PC021, E-50-5-2, filter with black soot
M3446	PC020, E-75-5-2, filter with black soot
M3447	PC022, E-100-5-2, filter with black soot
M3448	PC023, Blank

SAMPLE ANALYSIS

The samples were first examined by stereomicroscopy at magnifications from 1 to 50 times. The analysis was performed using a JEOL Model 6400 scanning electron microscope equipped with a Noran Voyager x-ray analysis system. The samples were examined using both secondary electron imaging and backscattered imaging at magnifications of 300x to 40,000x to determine a size distribution of particles that contained elements greater in atomic mass than carbon (carbon = atomic mass 6). Areas of the filter were also examined using both secondary electron imaging and backscattered imaging for carbon particles. Further analysis was performed using an analytical electron microscope (AEM) using a JEOL 1200, 100 kV scanning transmission electron microscope (STEM), equipped with a Noran EDS x-ray analysis system. This system was used to determine the size and elemental composition of the smallest particles.

RESULTS

Macroscopically, the sample filters appear to have thick deposits of dark soot-like material. The vast majority (nearly 100%) of the material in all samples (except the blank) was composed of very small (less than 0.5 µm) carbon particles that were aggregated together. Some of the aggregates were consistent with aciniform carbon soot (visually like bunches of grapes). Others appeared to be degraded or incompletely formed soot particles in aggregates. The aggregates were generally greater than 0.5 micrometers. Due to the fragile nature of the aggregates it was not possible to obtain reliable diameter ranges for the carbon particle aggregates. However, digital images taken with the transmission electron microscope were analyzed using the NIH image analysis program to size the ultimate carbon particles that make up the carbon soot aggregates. The average size of a representative sampling from all 10 samples of the individual carbon soot particles was 25 nm (0.025 µm) with a standard deviation of 8.8 nm.

Although not common, some non-carbon particles were found on the sample filters. For samples M3442, M3445, M3446 and M3447, there were a sufficient number of non-carbon particles upon which to perform a size distribution analysis. The results of the size distribution analyses are given on Table 1 (by number) and Table 2 (by estimated mass). Table 3 gives some information about the morphology of the non-carbon particles as shown by the comparison of particle aspect ratios (apparent length divided by apparent width). Over 60% of the non-carbon particles were essentially equant (having a length less than two times the width). Less than 15% of the non-carbon particles were elongated (having a length to width ratio greater than 3). Table 3 contains information about the aspect ratios for the four samples for which there were a sufficient number of non-carbon particles upon which to perform an analysis

Table 1. MVA 5228

Percentages of Non-Carbon Particles in Various Diameter Ranges by Number of Particles

	MVA Sample M3438	MVA Sample M3439	MVA Sample M3440	MVA Sample M3441	MVA Sample M3442
EQM Number	PC011	PC018	PC028	PC027	PC015
Diameter Range (um)					
0.5 - < 2.5	NA*	NA*	NA*	NA*	94.2%
2.5 - < 5.0	—	—	—	—	5.4%
5.0 - < 7.5	—	—	—	—	0.4%
7.5 - < 10	—	—	—	—	0.0%
≥10	—	—	—	—	0.0%

	MVA Sample M3443	MVA Sample M3444	MVA Sample M3445	MVA Sample M3446	MVA Sample M3447	MVA Sample M3448
EQM Number	PC014	PC024	PC021	PC020	PC022	PC023
Diameter Range (um)						
0.5 - < 2.5	NA*	NA*	97.7%	97.2%	100.0%	NA*
2.5 - < 5.0	—	—	1.8%	2.8%	0.0%	—
5.0 - < 7.5	—	—	0.3%	0.0%	0.0%	—
7.5 - < 10	—	—	0.0%	0.0%	0.0%	—
≥10	—	—	0.3%	0.0%	0.0%	—

*NA - Insufficient particles for a valid statistical analysis

Table 2. MVA 5228

Percentages of Non-Carbon Particles in Various Diameter Ranges by Estimated Mass of Particles

	MVA Sample M3438	MVA Sample M3439	MVA Sample M3440	MVA Sample M3441	MVA Sample M3442
EQM Number	PC011	PC018	PC028	PC027	PC015
Diameter Range (um)					
0.5 - < 2.5	NA*	NA*	NA*	NA*	36.1%
2.5 - < 5.0	—	—	—	—	43.6%
5.0 - < 7.5	—	—	—	—	20.4%
7.5 - < 10	—	—	—	—	0.0%
≥10	—	—	—	—	0.0%

	MVA Sample M3443	MVA Sample M3444	MVA Sample M3445	MVA Sample M3446	MVA Sample M3447	MVA Sample M3448
EQM Number	PC014	PC024	PC021	PC020	PC022	PC023
Diameter Range (um)						
0.5 - < 2.5	NA*	NA*	14.7%	46.6%	100.0%	NA*
2.5 - < 5.0	—	—	12.2%	53.4%	0.0%	—
5.0 - < 7.5	—	—	9.3%	0.0%	0.0%	—
7.5 - < 10	—	—	0.0%	0.0%	0.0%	—
≥10	—	—	63.9%	0.0%	0.0%	—

*NA - Insufficient particles for a valid statistical analysis

Table 3. MVA 5228

Percentages of Non-Carbon Particles in Various Aspect Ratio (length/width) Ranges

	MVA Sample M3442	MVA Sample M3445	MVA Sample M3446	MVA Sample M3447
EQM Number	PC015	PC021	PC020	PC022
Aspect Ratio Range				
1 - 2	62.2%	63.7%	74.4%	71.4%
2 - 3	22.4%	23.7%	14.0%	17.1%
3 - 5	14.7%	11.9%	11.6%	11.4%
> 5	0.7%	0.6%	0.0%	0.0%

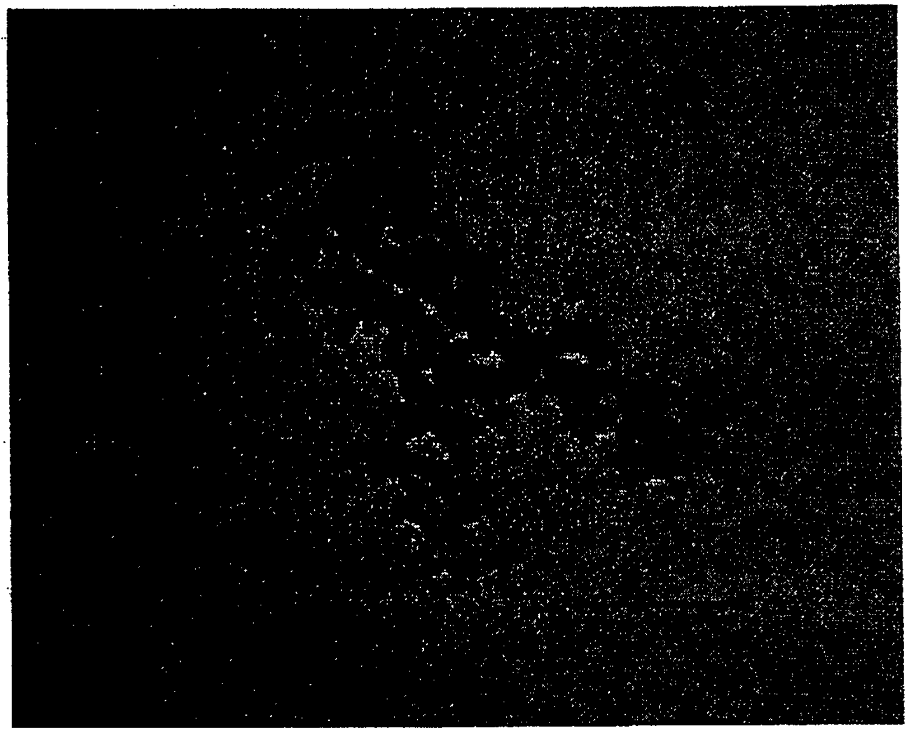

Figure 1. Transmission electron microscope image of carbon soot aggregates in Sample M3438.

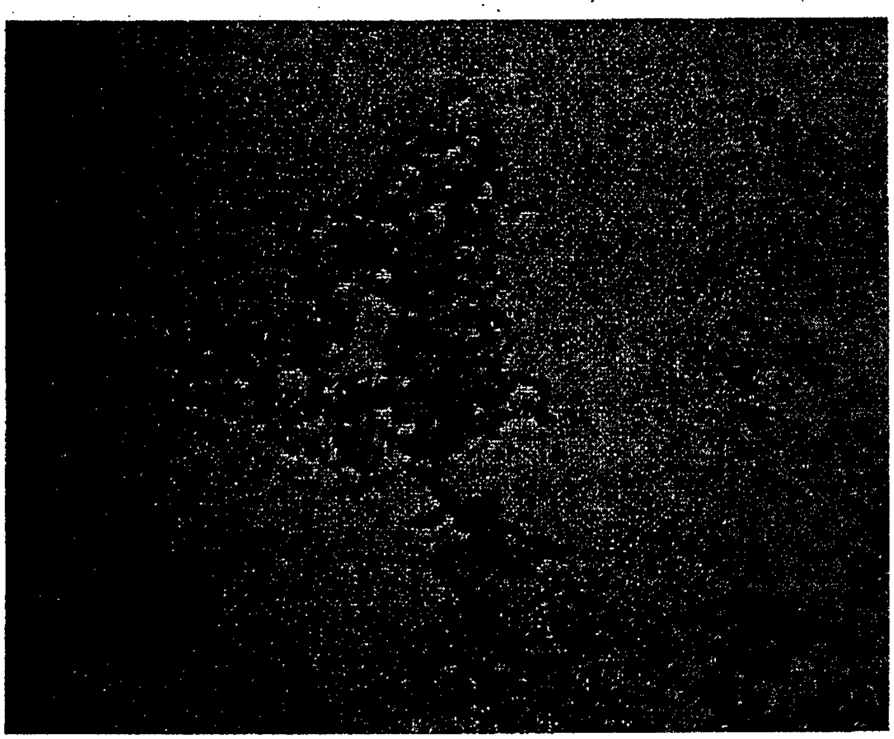

Figure 2. Transmission electron microscope image of carbon soot aggregates in Sample M3438.

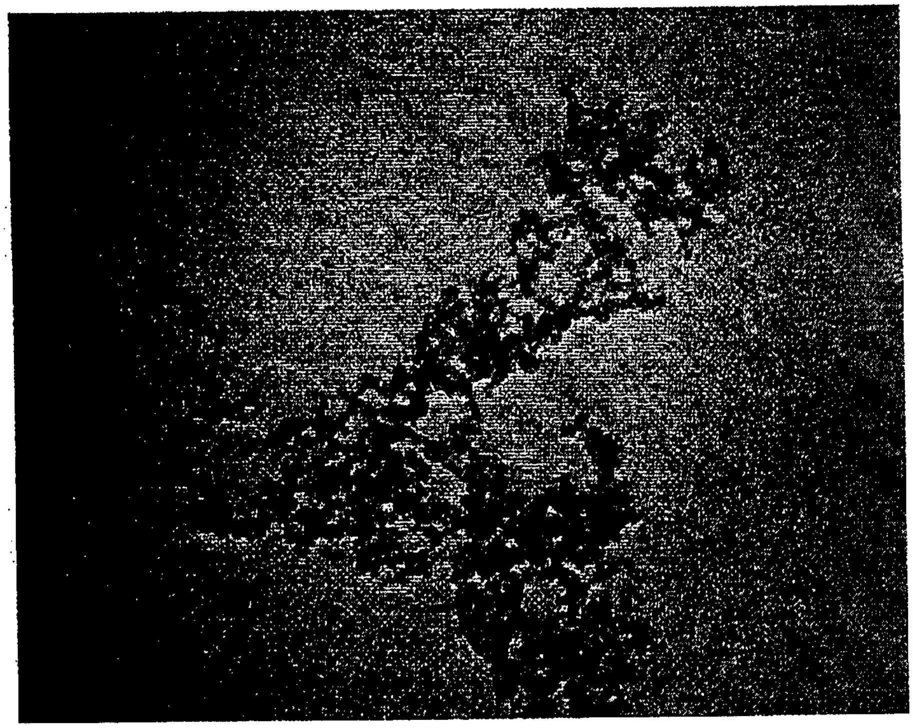

Figure 3. Transmission electron microscope image of carbon soot aggregates in Sample M3439.

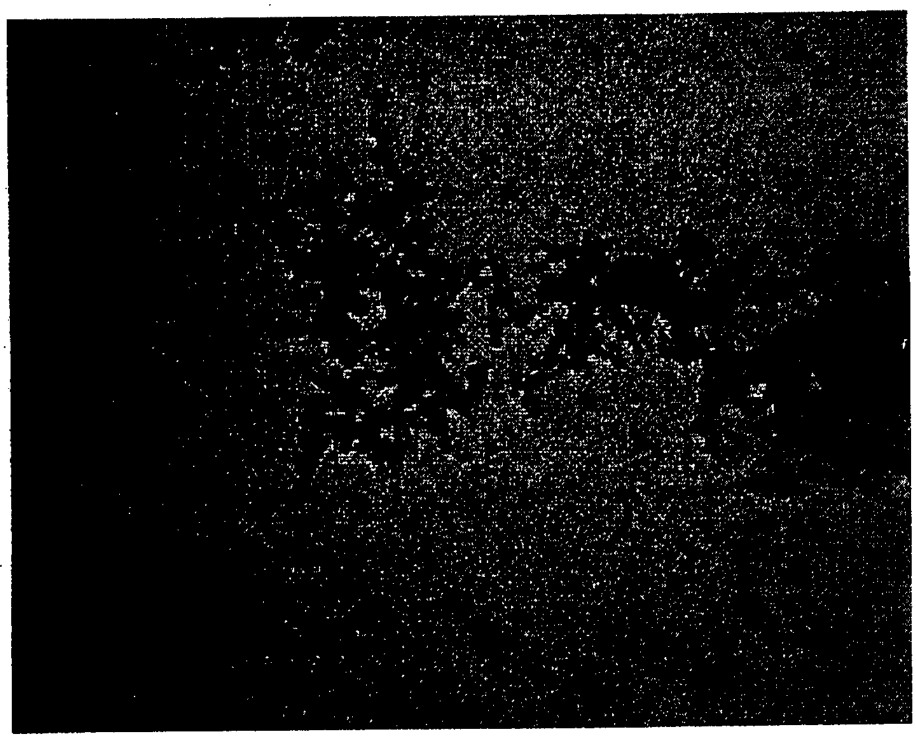

Figure 4. Transmission electron microscope image of carbon soot aggregates in Sample M3439.

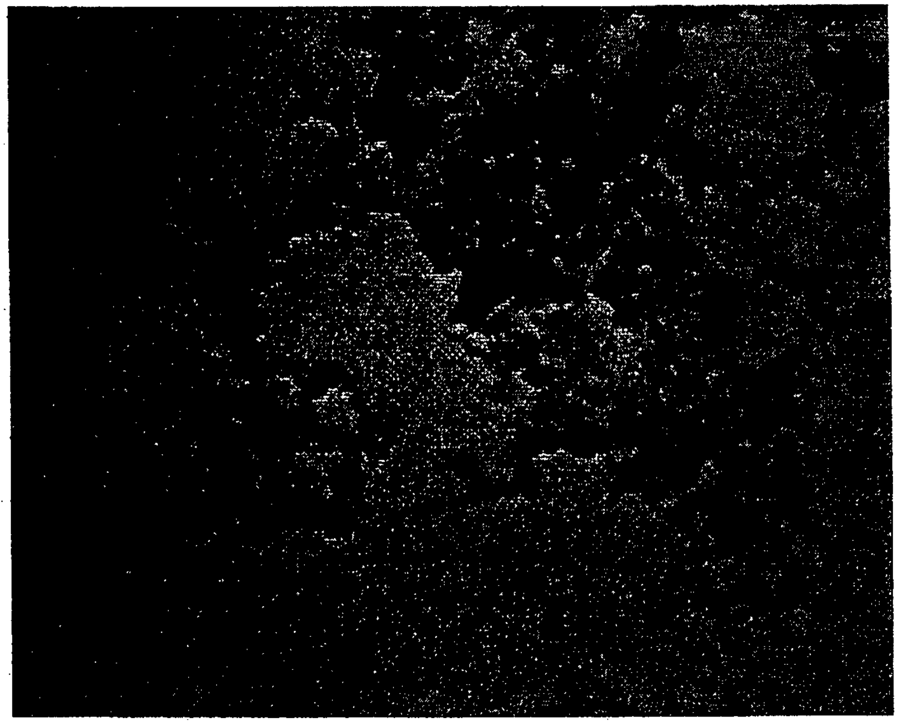

Figure 5. Transmission electron microscope image of carbon soot aggregates in Sample M3440.

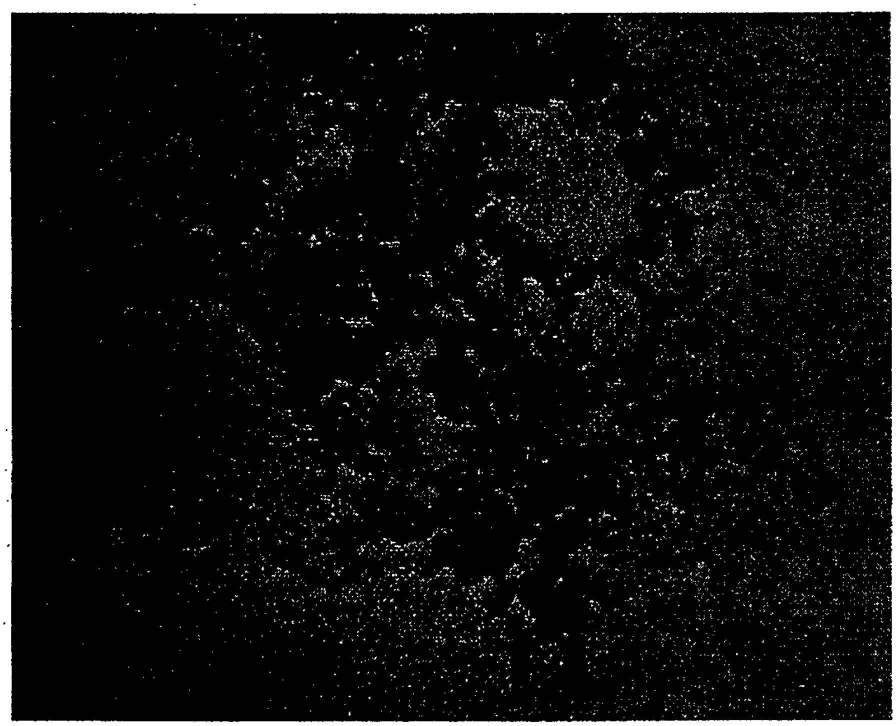

Figure 6. Transmission electron microscope image of carbon soot aggregates in Sample M3440.

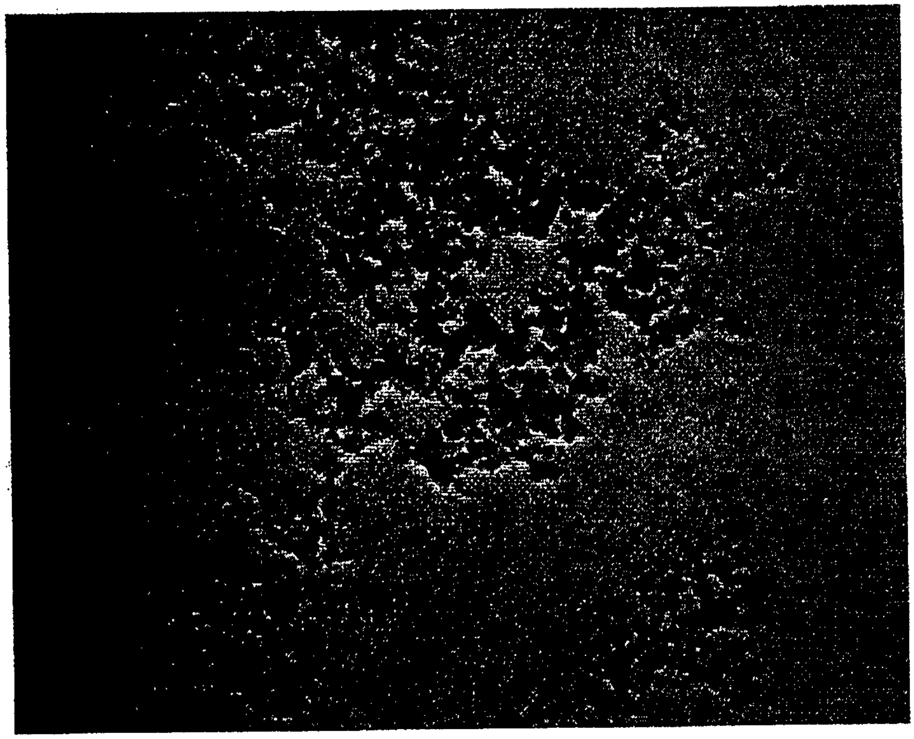

Figure 7. Transmission electron microscope image of carbon soot aggregates in Sample M3441.

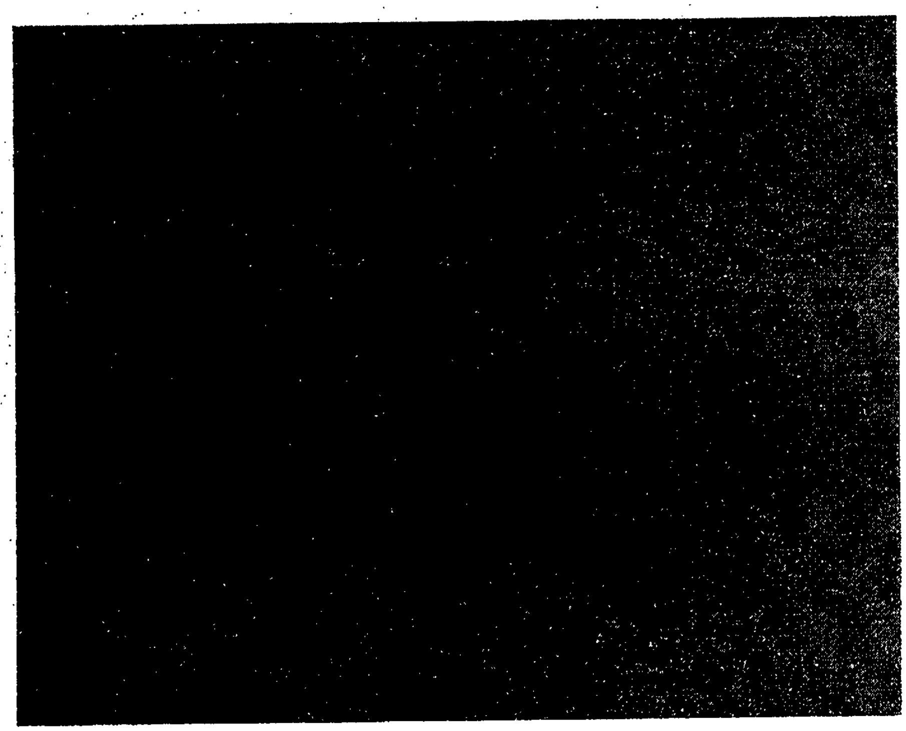

Figure 8. Transmission electron microscope image of carbon soot aggregates in Sample M3441.

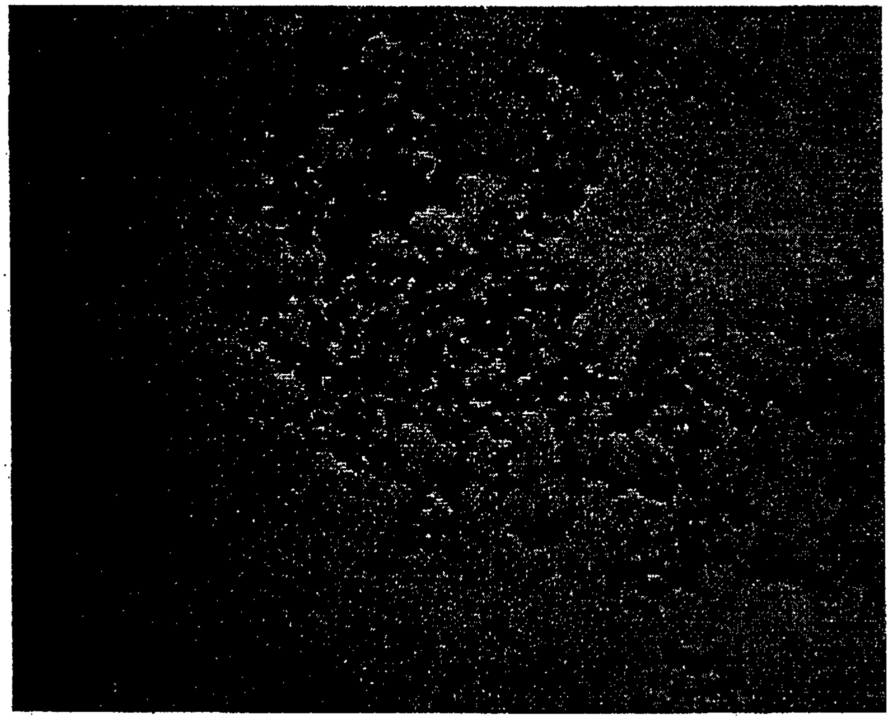

Figure 9. Transmission electron microscope image of carbon soot aggregates in Sample M3442.

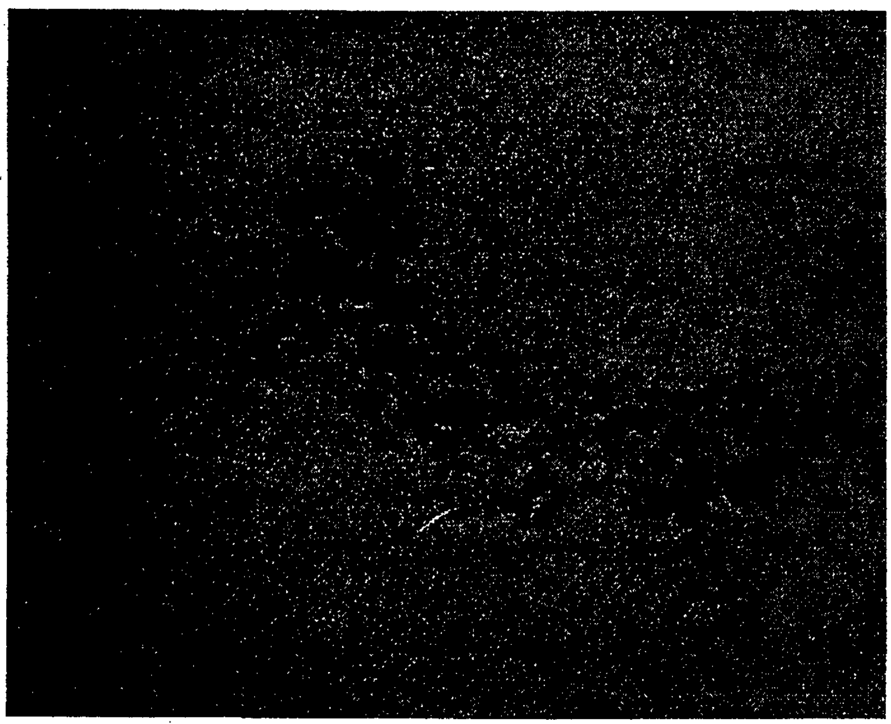

Figure 10. Transmission electron microscope image of carbon soot aggregates in Sample M3442.

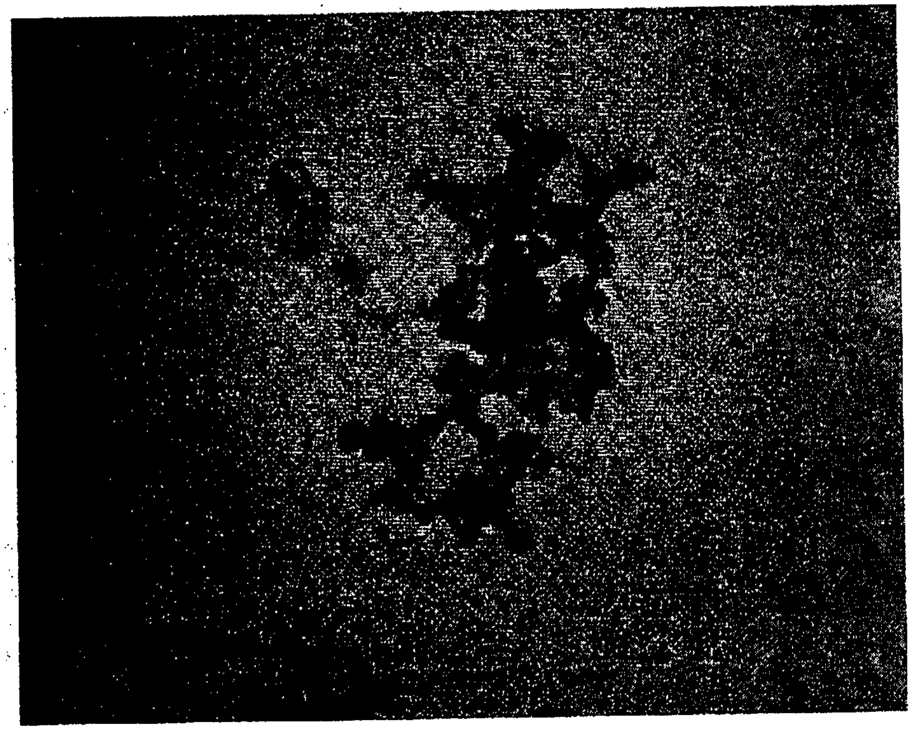

Figure 11. Transmission electron microscope image of carbon soot aggregates in Sample M3443.

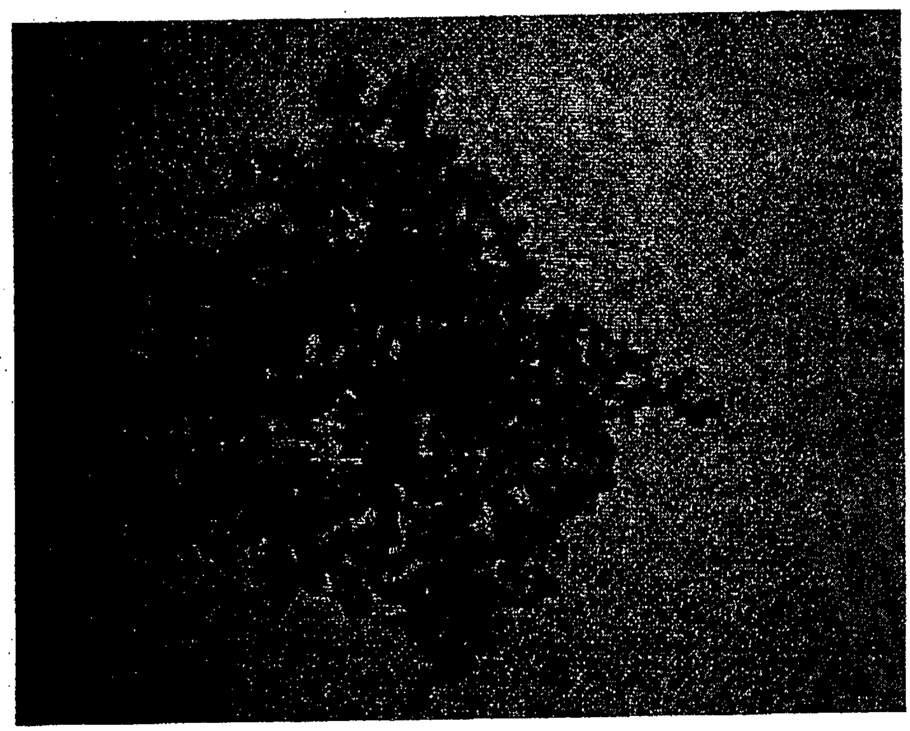

Figure 12. Transmission electron microscope image of carbon soot aggregates in Sample M3443.

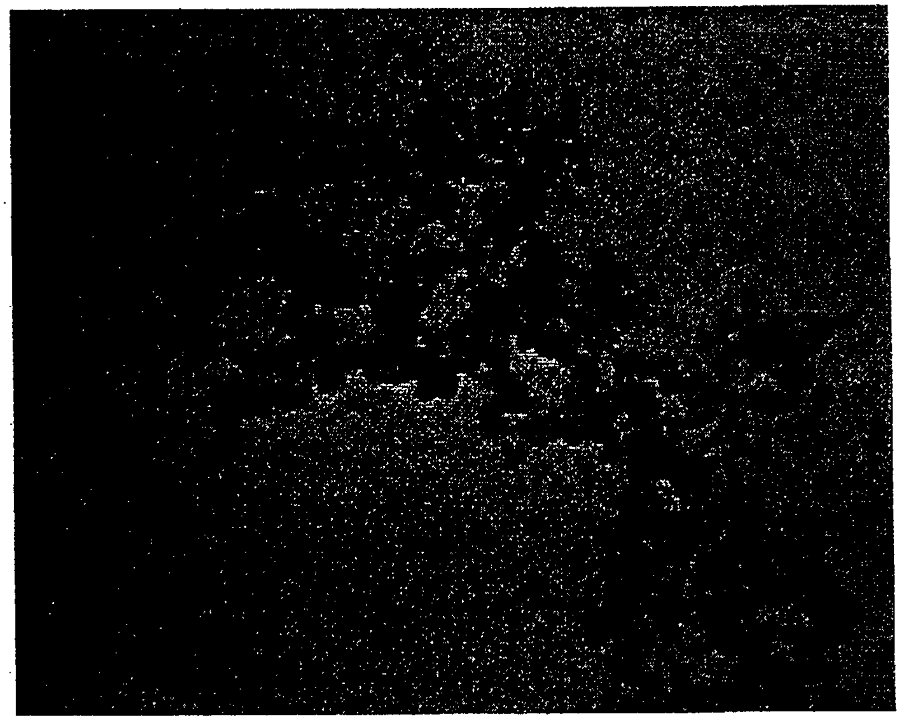

Figure 13. Transmission electron microscope image of carbon soot aggregates in Sample M3444.

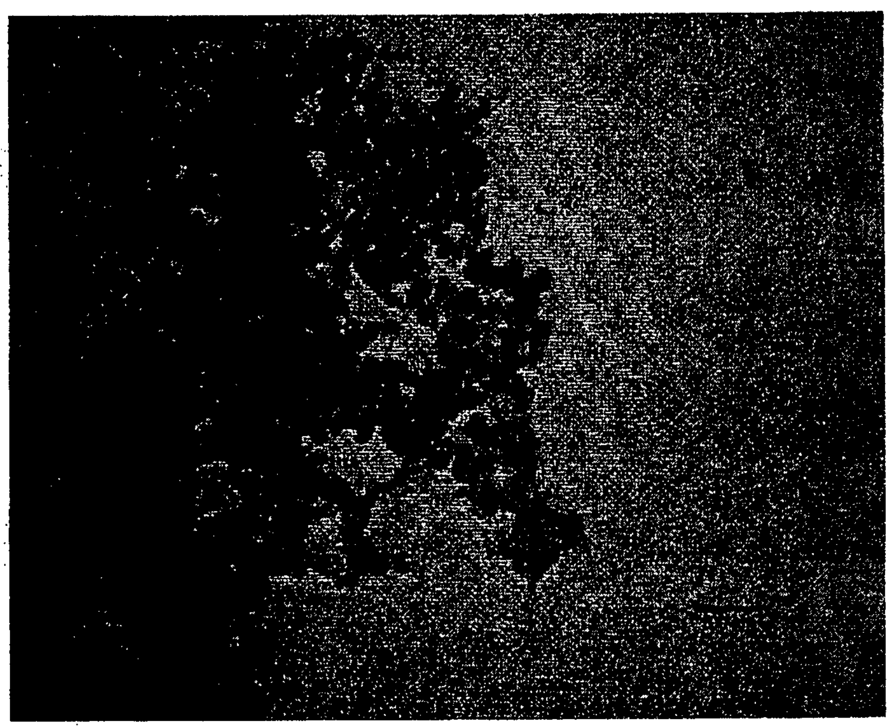

Figure 14. Transmission electron microscope image of carbon soot aggregates in Sample M3444.

Figure 15. Transmission electron microscope image of carbon soot aggregates in Sample M3445.

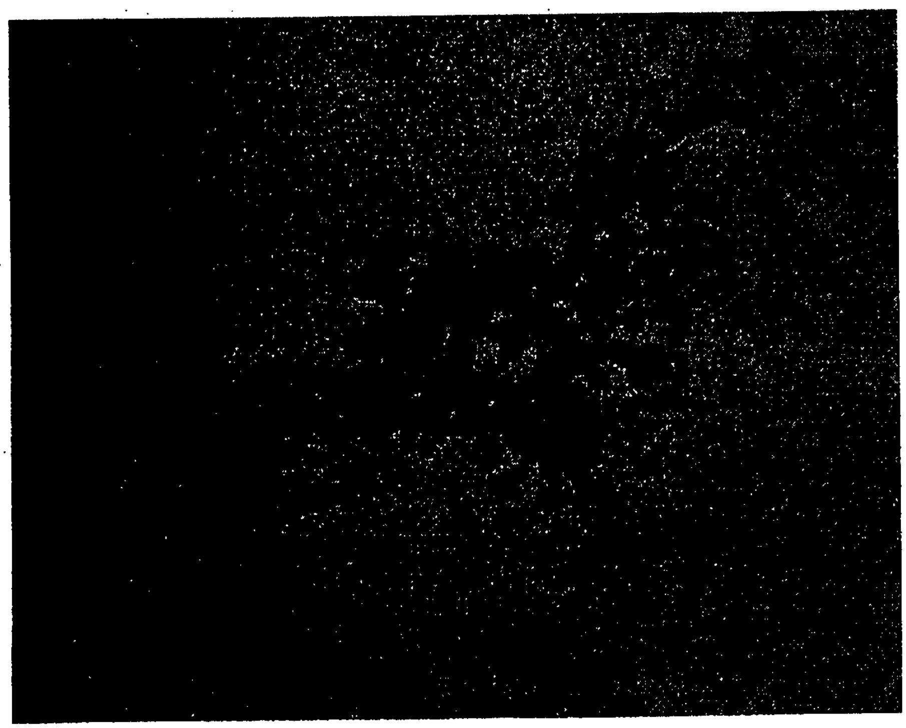

Figure 16. Transmission electron microscope image of carbon soot aggregates in Sample M3445.

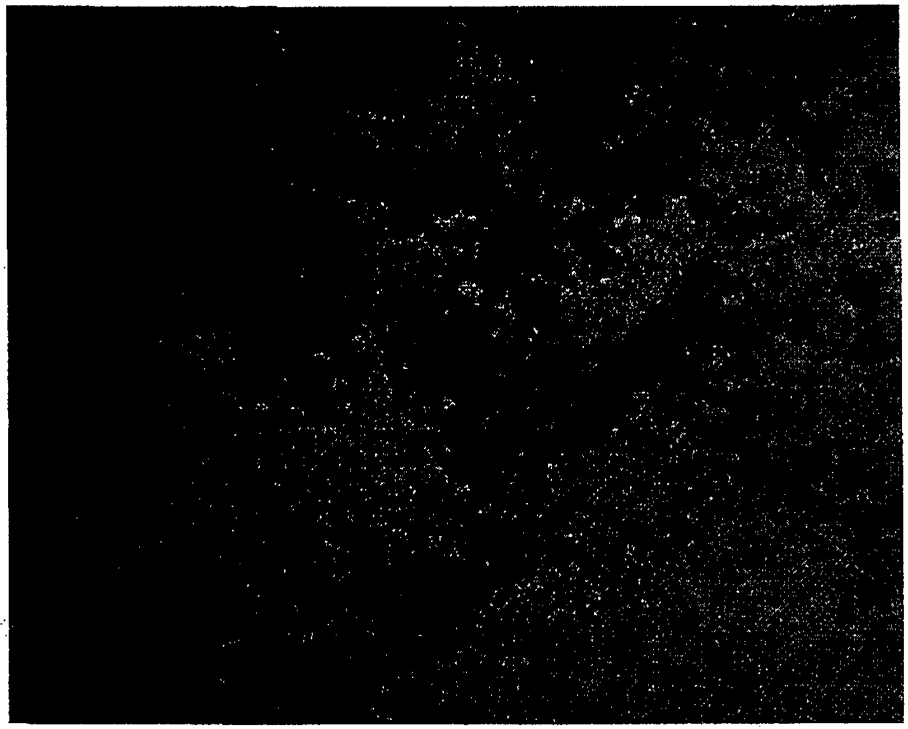

Figure 17. Transmission electron microscope image of carbon soot aggregates in Sample M3446.

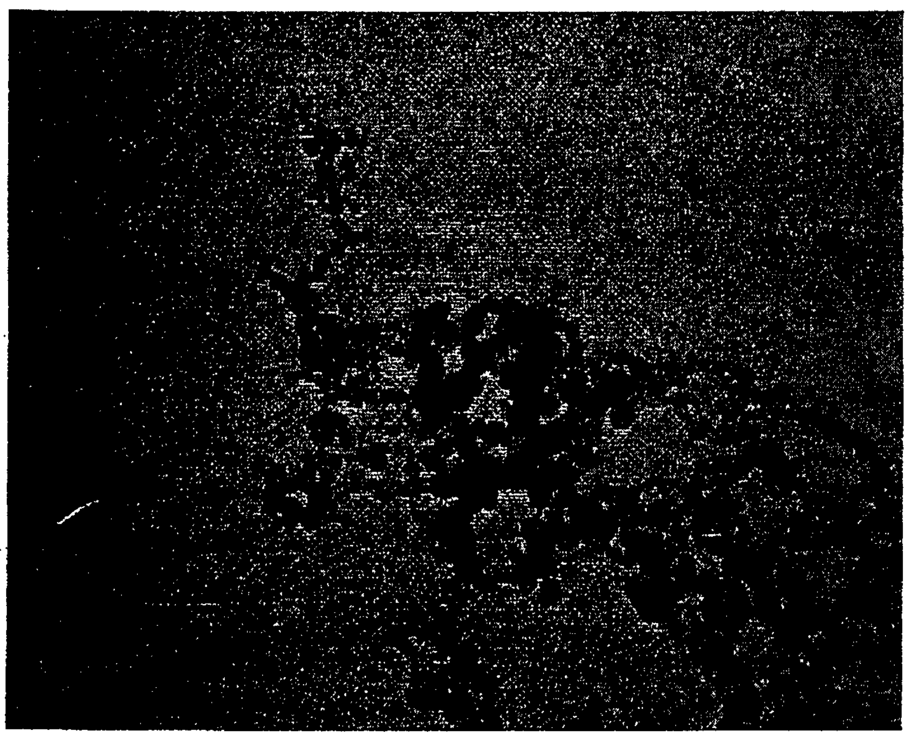

Figure 18. Transmission electron microscope image of carbon soot aggregates in Sample M3446.

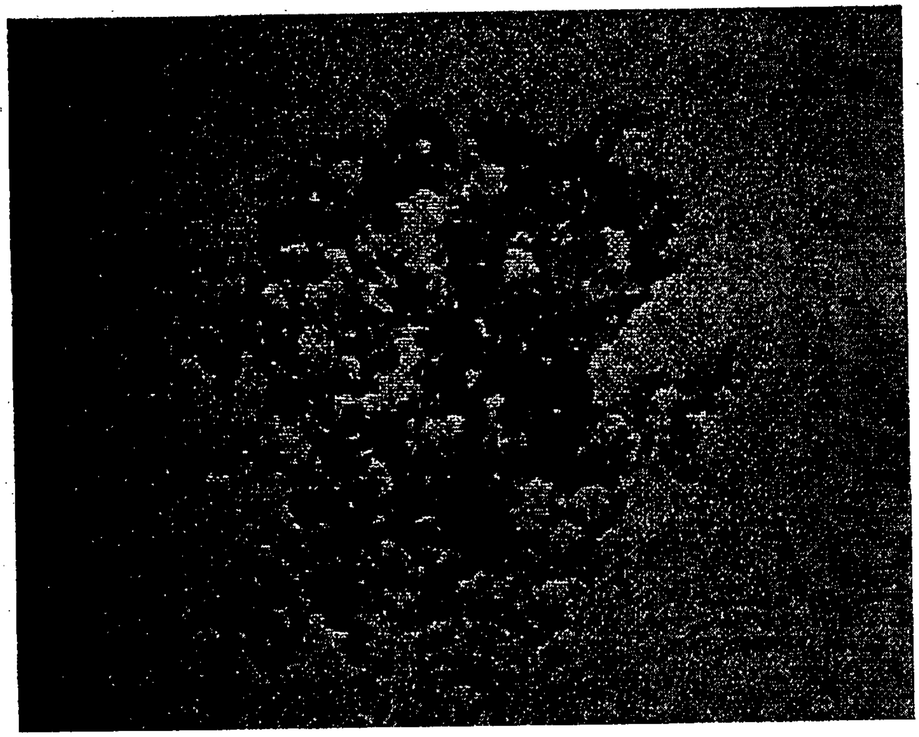

Figure 19. Transmission electron microscope image of carbon soot aggregates in Sample M3447.

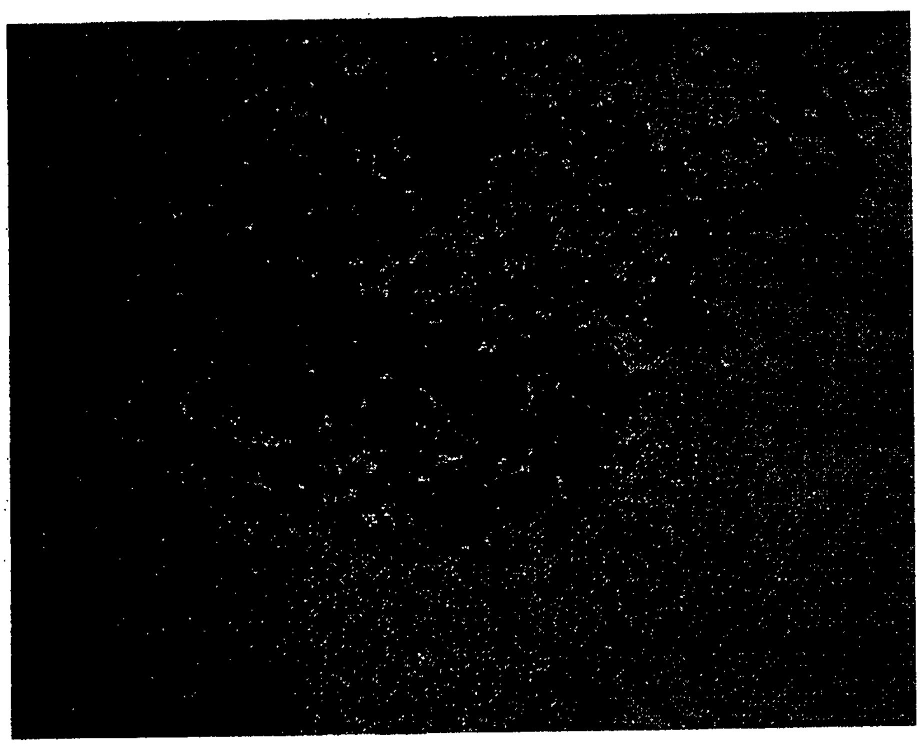

Figure 20. Transmission electron microscope image of carbon soot aggregates in Sample M3447.

MVA5228

Environmental Quality Management, Inc.

EQ Environmental Quality Management, Inc.

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Reference Document No. ______
Page 1 of 2

Project Name: USAF Travis/Elmendorf
Project Number: 30174.0003.002
Project Manager: T. Gerstle
Sample Team Leader: R. Kolde

Lab Destination: MVA, Inc.
Lab Contact/Phone: Pronda Few
Lab Purchase Order No.: 4446
Carrier/Waybill No.: ______

Report to: Ron Kolde
EQ
1800 Carillon Blvd.
Cincinnati, OH 45240

Bill to: ______

ONE CONTAINER PER LINE

Sample Number	Sample Description/Type	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Analytical Method/(Parameters)	Condition of Receipt (Lab)
PC011	Polycarbonate	6/11/02	Glass	NA	NA	Particle size	
PC018	Filters for	↓	↓	↓	↓	distribution by scanning	
PC028	Particulate					electron microscopy(SEM)	
PC027	collection					analysis, particle	
PC015						morphology	

Special Instructions:
Particle size distribution and particle size morphology and qualitative description of particles

Possible Hazard Identification:
Non-hazard ☒ Flammable ☐ Skin Irritant ☐ Other ______

Sample Disposal:
Return to Client ☐ Disposal by Lab ☒ Archive 6 (mos.)

Turnaround Time Required:
Normal ☒ Rush ☐ Results Required by ______

QA Requirements:

1. Relinquished by (Signature/Affiliation): [signature] Date: 8/20/02 Time: ______

1. Received by (Signature/Affiliation): [signature] MVA Date: 8/22/02 Time: ______

2. Relinquished by (Signature/Affiliation): Date: ______ Time: ______

2. Received by (Signature/Affiliation): Date: ______ Time: ______

Comments:

Environmental Quality Management, Inc.

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD (cont.)

Reference Document No. ______

Page 2 of 2

Project Name USAF Travis/Elmendorf

Project No. 30174.0003.002

Sample Shipment Date 8/20/02

ONE CONTAINER PER LINE

Sample Number	Sample Description/Type	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Analytical Method/(Parameters)	Condition on Receipt (Lab)
PC014	Same as	6/25/02	Glass	NA	NA	Same as	
PC024	others					others	
PC021							
PC020							
PC022							
PC023							

Rec'd J R [illegible] 8/[illegible]/02
MVA

TELEPHONE 773-772-3577
FAX NO 773-772-3778

Phoenix Chemical Laboratory, Inc.

FUEL AND LUBRICANT TECHNOLOGISTS
3953 SHAKESPEARE AVENUE
CHICAGO, ILL. 60647-3497

August 8, 2002

RECEIVED FROM Environmental Quality Management, Inc.
1800 Carillon Blvd.
Cincinnati, OH 45240
Attn: Tina Dunmoyer

SAMPLE OF See below

LABORATORY NO 02 7 30 5-7

MARKED See below

Lab. No.	02 7 30 5	02 7 30 6	02 7 30 7
Sample of	JP8	Diesel	JP8
Marked	Travis AFB 6/13/02 1200	Travis AFB 6/13/02 0700	E-JP8-1 6/27/02 0830
PONA ANALYSIS			
Saturates	84.9	83.6	-
Paraffins	Note 1	Note 1	26.3
Napthenes	Note 1	Note 1	55.8
Olefins	0.2	0.2	0.3
Aromatics	14.9	16.2	17.6
Sulfur, %	<0.005	0.010	0.097
Carbon, %	85.97	86.25	86.04
Hydrogen, %	13.86	13.56	13.73
Nitrogen, ppm	6	103	7
Ash, %	0.001	0.001	0.001
Heat of Combustion, BTU/Lb., Gross	19704	19744	19702
, Net	18440	18507	18449

Note 1: The Saturate fraction of the sample is to dense to permit separation of the naphthene fraction by the refractivity intercept metho
The saturates appear to be all naphthenes.

Arthur A. Krawetz

PHOENIX CHEMICAL LABORATORY, INC. FOUNDED 1927

1800 Carillon Blvd
Cincinnati, OH 45240
(513) 825-7500

Environmental Quality Management, Inc.
Chain of Custody Record

COC Tracking: EQ-10802

Project No.	Project Name		Lab P.O. No:
030 [illegible]	[illegible]		4295

Samplers/Affiliation: (Print Name and Sign) [illegible]

Sample ID:	Date	Time	Description/Matrix:	Sample Volume / Comments	No. of Containers	[illegible]	% [illegible]	% Carbon	% [illegible]	[illegible]	[illegible]	Cu/Cl
TRAVIS-JP8	6/13/02	12[illegible]	JP8	[illegible] ml	1	X	X	X	X	X	X	X
TRAVIS-DIESEL	6/13/02	0700	DIESEL	500 ml	1	X	X	X	X	X	X	X
E-JP8-1	6/28/02	0930	JP8	500 ml	1	X	X	X	X	X	X	X

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[illegible]	6/29/02	[illegible]			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

Ship To: PHOENIX CHEMICAL
3955 W. SHAKESPEARE AVE.
CHICAGO, IL [illegible]

Airbill Number: 835300082280

Reporting/QA Requirements:

Turn Around Time (**EXACT DUE DATE**): STANDARD

Report To: [illegible]
FAX: 513 825 7495

Chain of Custody Seal Numbers

Distribution: White - Accompanies Shipment Pink - Project Files Yellow - Laboratory File

eCVP

Electronic Comprehensive Validation Package

WO# 0207011B

Air Toxics Ltd.

180 Blue Ravine Road Ste. B
Folsom, CA 95630
Phone: 916/985-1000
Fax: 916/985-1020
eMail: atl@airtoxics.com
www.airtoxics.com

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

COMPREHENSIVE VALIDATION PACKAGE

Modified VOST 5041A/8260B

INVENTORY SHEET

Work Order #: 0207011B

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b. Target Compound Raw Data		
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-Surrogate Recovery Summary (If Applicable)		
-Chromatogram(s) and Ion Profiles (If Applicable)		
3. QC Results and Raw Data		
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c. Internal Standard Summary Form (If Applicable)	54	54
d. Duplicate Results Summary Sheet	--	--
e. Matrix Spike/Matrix Spike Duplicate (Results + Raw Data	--	--
f. Initial Calibration Data (Summary Sheet + Raw Data)	55	772
g. MDL Study (If Applicable)	--	--
h. Continuing Calibration Verification Data (Summary Sheet	773	819
i. Second Source LCS(Summary + Raw Data)	820	831
j Extraction Logs	--	--
k. Instrument Run Logs/Software Verification	832	833
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5. Other Records (describe or list)		
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d Laboratory Corrective Action Request	--	--
e. CAS Number Reference	852	852
f. Variance Table	--	--
g Canister Certification	--	--
h Data Review Check Sheet	853	853

Comments:

Completed by:

Judy Lee	Judy Lee / Document Control	7/22/02
(Signature)	(Print Name & Title)	(Date)

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0207011B

Work Order Summary

CLIENT:	Mr Tom Gerstle Environmental Quality Management, Inc. 1800 Carillon Boulevard Cincinnati, OH 45240	**BILL TO:**	Mr Tom Gerstle Environmental Quality Management, Inc 1800 Carillon Boulevard Cincinnati, OH 45240
PHONE:	800-229-7495 x 251	**P.O. #**	3966
FAX:	513-825-7495	**PROJECT #**	30174.0003.002 Elmendorf Air Force Base
DATE RECEIVED:	7/1/2002	**CONTACT:**	DeDe Dodge
DATE COMPLETED:	7/15/2002		

FRACTION #	NAME	TEST
01AB	E-0030-Comp	Modified VOST 5041A/8260B
02AB	Field Blank	Modified VOST 5041A/8260B
03AB	Lab Blank	Modified VOST 5041A/8260B
04A	Lab Blank	Modified VOST 5041A/8260B
05A	LCS	Modified VOST 5041A/8260B

CERTIFIED BY: Linda L. Freeman DATE: 07/16/02

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, NY NELAP - 11291, UT NELAP - 9166389892, LA NELAP/LELAP- AI 30763
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number E87680, Effective date: 07/01/02, Expiration date: 06/30/03

Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD. SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 FAX (916) 985-1020

LABORATORY NARRATIVE
VOST 5041A
Environmental Quality Management, Inc.
Workorder# 0207011B

Three VOST Pair samples were received on July 01, 2002. The laboratory performed the analysis via EPA SW-846 Method 5041A using GC/MS in the full scan mode. VOST sorbent tubes are thermally desorbed at 180 degrees centrigrade for ten minutes by UHP helium carrier gas. The gas stream is then bubbled through 5 mL of organic free water and trapped on the sorbent trap of the purge and trap system. The trap is thermally desorbed to elute the components into the GC/MS system for further separation. See the data sheets for the reporting limits for each compound.

Requirement	*VOST 5041A*	*ATL Modifications*
Batch certification	Blanks from the same media as samples	Analysis of set of cartridges prior to onset of any project;Sampling media provided by the client is batch certified ahead of time, only if client provides blank cartridges.
Tenax/tenax charcoal tube analysis	Separate tube analysis	Tubes are desorbed and analyzed simultaneously, unless specified by client
Method blank	Cartridges from the same media batches as the samples	Cartridges used for daily method blank may or may not be from the same batch or sampling media.
Connection between cartridge thermal desorption apparatus & sample purge vessel	PTFE 1/16" Teflon tubing	Heated, 1/16" nickel line
Flow rates	40 mL/min	40-45 mL/min
Storage of standards	Amber bottles with PTFE-lined screw caps	Clear vials capped with PTFE mininert valves
Calibration criteria for non-CCCs	RSD </= 15% for all non-CCCs	RSD </= 30% for some compounds: acetone, bromoform, vinyl acetate, bromomethane, chloromethane, 1,1,2,2-tetracholoroethane, & 1,2,3-trichloropropane; for some non-5041A compounds
BFB injection	Method 5041A - purge through water; Method 8260B - direct injection	Direct injection onto the column
Saturation level concentrations	Not specified	Samples desorbed into Tedlar bags

Receiving Notes

A Temperature Blank was included with the shipment. The ice included in the sample shipment melted during transit, therefore the temperature at receipt was greater than 6 degrees C. The client was notified via the login fax/email and the analysis proceeded.

The chain of custody information for all samples did not match the entries on the sample tags. The client was notified and the information on the chain of custody was used to process and report the sample.

Analytical Notes

The recovery of surrogate 1,2-Dichloroethane-d4 and 4-Bromofluorobenzene in sample E-0030-Comp was outside control limits due to the presence of saturation levels of target and nontarget species. It is not possible to re-run to confirm matrix or dilute for matrix using sorbent tube media. Data is reported as qualified.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the detection limit.

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

Table 1								
Client Sample ID	Lab Sample ID	Date Collected	Date Received	Date Extracted	Sample Holding Time (Days)	Date Analyzed	Sample Extract Holding Time (Days)	Sample Condition
E-0030-Comp	0207011B-01AB	6/25/2002	7/ 1/2002	NA	13	7/ 8/2002	NA	Good
Field Blank	0207011B-02AB	6/25/2002	NA	NA	13	7/ 8/2002	NA	Good
Lab Blank	0207011B-03AB	6/25/2002	NA	NA	13	7/ 8/2002	NA	Good
Lab Blank	0207011B-04A	NA	NA	NA	NA	7/ 8/2002	NA	Good
LCS	0207011B-05A	NA	NA	NA	NA	7/ 8/2002	NA	Good

Sample Results and Raw Data

AIR TOXICS LTD.

SAMPLE NAME: E-0030-Comp

ID#: 0207011B-01AB

MODIFIED VOST 5041A/8260B

File Name:	n070809	Date of Collection:	6/25/02
Dil. Factor:	1.00	Date of Analysis:	7/8/02

Compound	Rpt. Limit (ng)	Amount (ng)
Chloromethane	10	240
Bromomethane	10	140
Chloroethane	10	Not Detected
Freon 11	10	Not Detected
1,1-Dichloroethene	10	Not Detected
Carbon Disulfide	10	Not Detected
Acetone	50	1500 E
Methylene Chloride	10	520
trans-1,2-Dichloroethene	10	Not Detected
1,1-Dichloroethane	10	Not Detected
Vinyl Acetate	50	Not Detected
cis-1,2-Dichloroethene	10	Not Detected
2-Butanone (Methyl Ethyl Ketone)	50	1300 E
Chloroform	10	Not Detected
1,1,1-Trichloroethane	10	Not Detected
Carbon Tetrachloride	10	Not Detected
Benzene	10	>6900 S
1,2-Dichloroethane	10	Not Detected
Trichloroethene	10	Not Detected
1,2-Dichloropropane	10	Not Detected
Bromodichloromethane	10	Not Detected
cis-1,3-Dichloropropene	10	Not Detected
trans-1,3-Dichloropropene	10	Not Detected
4-Methyl-2-pentanone	50	Not Detected
Toluene	10	>6400 S
1,1,2-Trichloroethane	10	Not Detected
Tetrachloroethene	10	Not Detected
2-Hexanone	50	Not Detected
Dibromochloromethane	10	Not Detected
Chlorobenzene	10	Not Detected
Ethyl Benzene	10	3000 E
m,p-Xylene	10	>6300 S
o-Xylene	10	4100 E
Styrene	10	Not Detected
Bromoform	10	Not Detected
1,1,2,2-Tetrachloroethane	10	Not Detected
1,3-Butadiene	50	Not Detected

E = Exceeds instrument calibration range.
S = Saturated peak; data reported as estimated
Q = Exceeds Quality Control limits.
Container Type: VOST Pair

AIR TOXICS LTD.

SAMPLE NAME: E-0030-Comp

ID#: 0207011B-01AB

MODIFIED VOST 5041A/8260B

File Name:	n070809	Date of Collection: 6/25/02
Dil. Factor:	4.00	Date of Analysis: 7/8/02

Surrogates	%Recovery	Method Limits
Dibromofluoromethane	99	70-130
1,2-Dichloroethane-d4	172 Q	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	225 Q	70-130

eCVP

Electronic Comprehensive Validation Package

WO# 0206558

Air Toxics Ltd.

180 Blue Ravine Road Ste. B
Folsom, CA 95630
Phone: 916/985-1000
Fax: 916/985-1020
eMail: atl@airtoxics.com
www.airtoxics.com

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

COMPREHENSIVE VALIDATION PACKAGE

Modified Method 0011

INVENTORY SHEET

Work Order #: 0206558

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-Chromatogram(s) and Ion Profiles (If Applicable)		
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c Internal Standard Summary Form (If Applicable)	--	--
d Duplicate Results Summary Sheet	23	23
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f. Variance Table	--	--
g. Canister Certification	--	--
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Comments:

Completed by:

Judy Lee	Judy Lee / Document Control	7/18/02
(Signature)	(Print Name & Title)	(Date)

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0206558

Work Order Summary

CLIENT:	Mr. Tom Gerstle Environmental Quality Management, Inc. 1800 Carillon Boulevard Cincinnati, OH 45240	**BILL TO:**	Mr. Tom Gerstle Environmental Quality Management, Inc 1800 Carillon Boulevard Cincinnati, OH 45240
PHONE:	800-229-7495 x 251	**P.O. #**	3966
FAX:	513-825-7495	**PROJECT #**	30174.0003.002 Elmendorf Air Force Base
DATE RECEIVED:	6/28/2002	**CONTACT:**	DeDe Dodge
DATE COMPLETED:	7/15/2002		

FRACTION #	NAME	TEST
01A	E-0011-Comp	Modified Method 0011
01AA	E-0011-Comp Duplicate	Modified Method 0011
02A	DNPH Blank	Modified Method 0011
03A	MeCl2/H2O Blank	Modified Method 0011
04A	LCS	Modified Method 0011
05A	Lab Blank	Modified Method 0011

CERTIFIED BY: Linda D. Freeman

Laboratory Director

DATE: 07/15/02

Certfication numbers: CA NELAP - 02110CA, NY NELAP - 11291, UT NELAP - 9166389892, LA NELAP/LELAP- AI 30763
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/02, Expiration date: 06/30/03

Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
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LABORATORY NARRATIVE
Method 0011/8315A
Environmental Quality Management, Inc.
Workorder# 0206558

Three Jar samples were received on June 28, 2002. The laboratory performed the analysis via Modified EPA SW-846 Method 0011/8315 using High Pressure Liquid Chromatography (HPLC) with an Ultraviolet (UV) Detector. See the data sheets for the reporting limits for each compound.

Receiving Notes

The chain of custody information for sample E-0011-Comp did not match the entry on the sample tag. The client was notified and the information on the chain of custody was used to process and report the sample.

The chain of custody information for samples DNPH Blank, and MeCl2/H2O Blank did not match the entries on the sample tags with regard to sample identification. The client was notified of the discrepancy by email/fax. Lack of a response was assumed to be permission given to use the information on the sample tag.

Analytical Notes

Acetaldehyde and Hexanal were detected in the laboratory blank. The "B" flags were applied to the associated results.

The extraction solvent was added to the samples E-0011-Comp and MeCl2/H2O Blank in the field, therefore the date of extraction is also the date of collection. The extraction date for the laboratory QC analyses that are associated with the workorder is the date that the extraction was completed.

The concentration of Iso-pentanal was below the Reporting Limit in the initial analysis of sample E-0011-COMP. %RPD method control limits are waived when analyte concentration in either the initial or the duplicate analysis is less than 5X the Reporting Limit. In addition, % RPD is not reported when one of the two replicate analyte concentrations is below the Reporting Limit.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:
B- Compound present in laboratory blank greater than reporting limit.
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the detection limit.
M - Reported value may be biased due to apparent matrix interferences.

File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Table 1								
Client Sample ID	Lab Sample ID	Date Collected	Date Received	Date Extracted	Sample Holding Time (Days)	Date Analyzed	Sample Extract Holding Time (Days)	Sample Condition
E-0011-Comp	0206558-01A	6/25/2002	6/28/2002	6/25/2002	0	7/12/2002	17	Good
E-0011-Comp Duplicate	0206558-01AA	6/25/2002	6/28/2002	6/25/2002	0	7/12/2002	17	Good
DNPH Blank	0206558-02A	6/26/2002	NA	7/1/2002	5	7/2/2002	1	Good
MeCl2/H2O Blank	0206558-03A	6/26/2002	NA	6/26/2002	0	7/2/2002	6	Good
LCS	0206558-04A	NA	NA	7/1/2002	NA	7/1/2002	0	Good
Lab Blank	0206558-05A	NA	NA	7/1/2002	NA	7/1/2002	0	Good

Sample Results and Raw Data

AIR TOXICS LTD.

SAMPLE NAME: E-0011-Comp

ID#: 0206558-01A

MODIFIED EPA SW-846 METHOD 0011/8315A HPLC

File Name:	e0712007	Date of Collection: 6/25/02
Dil. Factor:	26.4	Date of Analysis: 7/12/02
		Date of Extraction: 6/25/02

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	13	310
Acetaldehyde	13	110 B
Acrolein	13	240
Propanal	13	52
Crotonaldehyde	13	150
Methyl Ethyl Ketone/Butyraldehydes	13	66
Benzaldehyde	13	250
Isopentanal	13	Not Detected
Pentanal	13	81
o-Tolualdehyde	13	67
m,p-Tolualdehyde	13	290
Hexanal	13	67 B

B = Compound present in laboratory blank greater than reporting limit, background subtraction not performed.

TOTAL VOLUME=485ML

Container Type: Jar

eCVP

Electronic Comprehensive Validation Package

WO# 0207011A

Air Toxics Ltd.

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

COMPREHENSIVE VALIDATION PACKAGE

Modified NIOSH 5515

INVENTORY SHEET

Work Order #: 0207011A

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d. Laboratory Corrective Action Request	--	--
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Comments:

Completed by:

Brad Mosakowski	Brad Mosakowski / Document Control	7/22/02
(Signature)	(Print Name & Title)	(Date)

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0207011A

Work Order Summary

CLIENT:	Mr Tom Gerstle Environmental Quality Management, Inc. 1800 Carillon Boulevard Cincinnati, OH 45240	**BILL TO:**	Mr. Tom Gerstle Environmental Quality Management, Inc. 1800 Carillon Boulevard Cincinnati, OH 45240
PHONE:	800-229-7495 x 251	**P.O. #**	3966
FAX:	513-825-7495	**PROJECT #**	30174.0003.002 Elmendorf Air Force Base
DATE RECEIVED:	7/1/2002	**CONTACT:**	DeDe Dodge
DATE COMPLETED:	7/15/2002		

FRACTION #	NAME	TEST
01A	E-PAH-Comp	Modified NIOSH 5515
02A	Trip Blank	Modified NIOSH 5515
03A	Field Blank	Modified NIOSH 5515
04A	LCS	Modified NIOSH 5515
05A	Lab Blank	Modified NIOSH 5515

CERTIFIED BY: Linda L. Freeman DATE: 07/16/02

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, NY NELAP - 11291, UT NELAP - 9166389892, LA NELAP/LELAP- AI 30763
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/02, Expiration date: 06/30/03

Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

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LABORATORY NARRATIVE
Modified NIOSH 5515
Environmental Quality Management, Inc.
Workorder# 0207011A

Three NIOSH Tubes XAD-2 with filter samples were received on July 01, 2002. The laboratory performed the analysis for Polyaromatic Hydrocarbons (PAHs) via Modified NIOSH Method 5515. The method involves solvent desorption using Methylene Chloride, followed by separation and analysis using GC/MS. See the data sheets for the reporting limits for each compound.

Requirement	*NIOSH 5515*	*ATL Modifications*
Target compounds	List includes Benzo(e)pyrene.	Standard list does not include Benzo(e)pyrene
Determination of Optimal Solvent	Test is performed on sample filters to determine optimal solvent: Acetonitrile, Benzene, Cyclohexane, or Methylene Chloride.	Methylene Chloride is used as the extraction solvent for all samples.
Standard preparation	Standards are prepared in Toluene using neat compounds.	Commercially available standard mixes in methylene chloride are used.
Calibration range	Suggested range of 0.005 to 5 ug/mL.	Range is approximately 1.0 to 160 ug/mL.
Recovery study for filter	For each filter lot, spike 4 filters at each of the 5 calibration levels Extract, analyze, and calculate recovery.	Not performed unless requested.
Laboratory Control Spikes	With each analytical batch, spike and extract duplicate filters and tubes. If recovery varies by more than +/-5% from the recovery and desorption efficiency study results, than repeat the studies.	Spike filter and tube with each batch. Acceptance criterion is 50%-150%.
Lab Blank	Analyze at least three field blanks for each sample medium. Average blank level is subtracted from the sample results.	One lab blank is analyzed per batch; no blank subtraction is performed.
Concentration calculations	Results are corrected for %Recovery and desorption efficiency.	No correction of results performed. A copy of the desorption study is available upon request
Units	The air concentration in mg/m3 is reported.	Standard reporting unit is mass concentration (ug).
Detector	Flame Ionization Detector (FID)	Mass Spectrometer (MS)

Receiving Notes

A Temperature Blank was included with the shipment. The ice included in the sample shipment melted during transit, therefore the temperature at receipt was greater than 6 degrees C. The client was notified via the login fax/email and the analysis proceeded.

The chain of custody information for sample Trip Blank did not match the entry on the sample tag. The client was notified and the information on the chain of custody was used to process and report the sample.

Analytical Notes

A tube and a filter were received for each sample. The filter and sorbent were extracted and analyzed separately and the results for each analyte were combined additively and reported as a single concentration.

Results for sample E-PAH-Comp are reported from the front tube only as the back tube for this sample was non-detect for target analytes. There were no target analytes detected in the remaining samples in the front tubes, which implies that no significant breakthrough had occurred, and therefore only the front tube results are reported.

Sample results are not corrected for the desorption efficiency.

Definition of Data Qualifying Flags

Six qualifiers may have been used on the data analysis sheets and indicate as follows:
B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the detection limit.

File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Table 1								
Client Sample ID	Lab Sample ID	Date Collected	Date Received	Date Extracted	Sample Holding Time (Days)	Date Analyzed	Sample Extract Holding Time (Days)	Sample Condition
E-PAH-Comp	0207011A-01A	6/25/2002	7/ 1/2002	7/ 9/2002	14	7/10/2002	1	Good
Trip Blank	0207011A-02A	6/26/2002	NA	7/ 9/2002	13	7/10/2002	1	Good
Field Blank	0207011A-03A	6/26/2002	NA	7/ 9/2002	13	7/11/2002	2	Good
LCS	0207011A-04A	NA	NA	7/ 9/2002	NA	7/10/2002	1	Good
Lab Blank	0207011A-05A	NA	NA	7/ 9/2002	NA	7/10/2002	1	Good

Sample Results and Raw Data

AIR TOXICS LTD.

SAMPLE NAME: E-PAH-Comp

ID#: 0207011A-01A

MODIFIED NIOSH METHOD 5515 GC/MS

File Name:	[illegible]	Date of Collection:	6/25/02
Dil. Factor:	100	Date of Analysis:	7/10/02
		Date of Extraction:	7/9/02

Compound	Rpt. Limit (ug)	Amount (ug)
Naphthalene	1.0	12
2-Methylnaphthalene	1.0	12
2-Chloronaphthalene	1.0	Not Detected
Acenaphthene	1.0	Not Detected
Acenaphthylene	1.0	Not Detected
Fluorene	1.0	Not Detected
Phenanthrene	1.0	Not Detected
Anthracene	1.0	Not Detected
Fluoranthene	1.0	Not Detected
Pyrene	1.0	Not Detected
Chrysene	1.0	Not Detected
Benzo(a)anthracene	1.0	Not Detected
Benzo(b)fluoranthene	1.0	Not Detected
Benzo(k)fluoranthene	1.0	Not Detected
Benzo(a)pyrene	1.0	Not Detected
Indeno(1,2,3-c,d)pyrene	1.0	Not Detected
Dibenz(a,h)anthracene	1.0	Not Detected
Benzo(g,h,i)perylene	1.0	Not Detected

Container Type: NIOSH Tubes XAD-2 w/Filter

Surrogates	%Recovery	Method Limits
2-Fluorobiphenyl	98	50-150
Terphenyl-d14	100	50-150

eCVP

Electronic Comprehensive Validation Package

WO# 0206242

Air Toxics Ltd.

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COMPREHENSIVE VALIDATION PACKAGE

Modified Method 0011

INVENTORY SHEET

Work Order #: 0206242

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5. Other Records (describe or list)		
a. Manual Spectral Defense	--	--
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e. CAS Number Reference	167	167
f Variance Table	--	--
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Comments:

Completed by:

Judy Lee	Judy Lee / Document Control	7/8/02
(Signature)	(Print Name & Title)	(Date)

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0206242

Work Order Summary

CLIENT:	Mr. Tom Gerstle Environmental Quality Management, Inc. 1800 Carillon Boulevard Cincinnati, OH 45240	**BILL TO:**	Mr. Tom Gerstle Environmental Quality Management, Inc 1800 Carillon Boulevard Cincinnati, OH 45240
PHONE:	800-229-7495 x 251	**P.O. #**	3966
FAX:	513-825-7495	**PROJECT #**	30174.0003.002 Travis AFB
DATE RECEIVED:	6/14/2002	**CONTACT:**	DeDe Dodge
DATE COMPLETED:	6/26/2002		

FRACTION #	NAME	TEST
01A	T-0011-Comp	Modified Method 0011
01AA	T-0011-Comp Duplicate	Modified Method 0011
02A	Blank DNPH	Modified Method 0011
03A	Blank H2O/MeCl2	Modified Method 0011
04A	LCS	Modified Method 0011
05A	Lab Blank	Modified Method 0011

CERTIFIED BY: Linda L. Freeman DATE: 06/27/02

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, NY NELAP - 11291, UT NELAP - 9166389892, LA NELAP/LELAP- AI 30763
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 01/01/02, Expiration date: 06/30/02

Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

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LABORATORY NARRATIVE
Method 0011/8315A
Environmental Quality Management, Inc.
Workorder# 0206242

Three DNPH Bottle samples were received on June 14, 2002. The laboratory performed the analysis via Modified EPA SW-846 Method 0011/8315 using High Pressure Liquid Chromatography (HPLC) with an Ultraviolet (UV) Detector. See the data sheets for the reporting limits for each compound.

Receiving Notes

A Temperature Blank was included with the shipment. Temperature was measured and was not within 4 degrees C. +/- 2 degrees. Coolant in the form of blue ice was present. The client was notified via the login fax/email and the analysis proceeded.

Analytical Notes

The extraction solvent was added to the sample T-0011-Comp in the field, therefore the date of extraction is also the date of collection. The extraction date for the laboratory QC analyses that are associated with the workorder is the date that the extraction was completed.

Extraction solvent was not added to sample Blank DNPH at the time of collection which may have caused a breakdown of Acrolein in the acidic DNPH reagent. Acrolein results are reported as qualified.

Acetaldehyde was detected in the laboratory blank. The "B" flag was applied to the associated results.

The RPD of duplicate sample T-0011-Comp exceeded acceptance limits for the target compounds Iso-Pentanal and o-Tolualdehyde due to on-column concentrations that were less than 5X the reporting limit. There is no effect on data quality

The RPD of duplicate sample T-0011-Comp exceeded acceptance limits for the target compound m,p-Tolualdehyde.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:
B- Compound present in laboratory blank greater than reporting limit.
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the detection limit.
M - Reported value may be biased due to apparent matrix interferences.

File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Table 1

Client Sample ID	Lab Sample ID	Date Collected	Date Received	Date Extracted	Sample Holding Time (Days)	Date Analyzed	Sample Extract Holding Time (Days)	Sample Condition
T-0011-Comp	0206242-01A	6/11/2002	6/14/2002	6/11/2002	0	6/21/2002	10	Good
T-0011-Comp Duplicate	0206242-01AA	6/11/2002	6/14/2002	6/11/2002	0	6/21/2002	10	Good
Blank DNPH	0206242-02A	6/12/2002	NA	6/14/2002	2	6/14/2002	0	Good
Blank H2O/MeCl2	0206242-03A	6/12/2002	NA	6/14/2002	2	6/14/2002	0	Good
LCS	0206242-04A	NA	NA	6/14/2002	NA	6/14/2002	0	Good
Lab Blank	0206242-05A	NA	NA	6/14/2002	NA	6/14/2002	0	Good

Sample Results and Raw Data

AIR TOXICS LTD.

SAMPLE NAME: T-0011-Comp

ID#: 0206242-01A

MODIFIED EPA SW-846 METHOD 0011/8315A HPLC

File Name: e0621016	Date of Collection: 6/11/02
Dil. Factor: 7.40	Date of Analysis: 6/21/02
	Date of Extraction: 6/11/02

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	3.7	72
Acetaldehyde	3.7	51 B
Acrolein	3.7	100 M
Propanal	3.7	24
Crotonaldehyde	3.7	68
Methyl Ethyl Ketone/Butyraldehydes	3.7	20
Benzaldehyde	3.7	110
Isopentanal	3.7	9.6
Pentanal	3.7	43
o-Tolualdehyde	3.7	9.4
m,p-Tolualdehyde	3.7	66
Hexanal	3.7	19

B = Compound present in laboratory blank greater than reporting limit, background subtraction not performed.
M = Reported value may be biased due to apparent matrix interferences
TOTAL VOLUME=600ML

Container Type: DNPH Bottle

eCVP

Electronic Comprehensive Validation Package

WO# 0206241

Air Toxics Ltd.

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AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

COMPREHENSIVE VALIDATION PACKAGE

Modified Other NIOSH

INVENTORY SHEET

Work Order #: 0206241

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-Surrogate Recovery Summary (If Applicable)		
-Chromatogram(s) and Ion Profiles (If Applicable)		
3. QC Results and Raw Data		
a. Method Blank (Results+ Raw Data)	19	29
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j Extraction Logs	208	208
k. Instrument Run Logs/Software Verification	209	211
l. GC/MS Tune (Results + Raw Data)	212	223
4. Shipping/Receiving Documents		
a. Login Receipt Summary Sheet	225	225
b. Chain-of-Custody Records	226	226
c. Sample Log-In Sheet	227	227
d Misc Shipping/Receiving Records (list of individual records) Sample Receipt Discrepancy Report	228	228
5 Other Records (describe or list)		
a. Manual Spectral Defense	--	--
b. Manual Integrations	--	--
c. Canister Dilution Factors	230	231
d. Laboratory Corrective Action Request	--	--
e. CAS Number Reference	232	232
f Variance Table	--	--
g Canister Certification	--	--
h. Data Review Check Sheet	233	233

Comments:

Completed by:

Brad Mosakowski	Brad Mosakowski / Document Control	7/8/02
(Signature)	(Print Name & Title)	(Date)

@ **AIR TOXICS LTD.**

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0206241

Work Order Summary

CLIENT:	Mr Tom Gerstle Environmental Quality Management, Inc 1800 Carillon Boulevard Cincinnati, OH 45240	**BILL TO:**	Mr. Tom Gerstle Environmental Quality Management, Inc. 1800 Carillon Boulevard Cincinnati, OH 45240
PHONE:	800-229-7495 x 251	**P.O. #**	3966
FAX:	513-825-7495	**PROJECT #**	30174.0003 002 Travis AFB
DATE RECEIVED:	6/14/2002	**CONTACT:**	DeDe Dodge
DATE COMPLETED:	6/26/2002		

FRACTION #	NAME	TEST
01A	T-PAH-Comp	Modified Other NIOSH
02A	Blank-Trip	Modified Other NIOSH
03A	LCS	Modified Other NIOSH
04A	Lab Blank	Modified Other NIOSH

CERTIFIED BY: Linda d. Fruman DATE: 06/27/02

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, NY NELAP - 11291, UT NELAP - 9166389892, LA NELAP/LELAP- AI 30763
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 01/01/02, Expiration date: 06/30/02

Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

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LABORATORY NARRATIVE
Modified NIOSH 5515
Environmental Quality Management, Inc.
Workorder# 0206241

Two NIOSH Tubes XAD-2 w/Filter samples were received on June 14, 2002. The laboratory performed the analysis for Polyaromatic Hydrocarbons (PAHs) via Modified NIOSH Method 5515. The method involves solvent desorption using Methylene Chloride, followed by separation and analysis using GC/MS. See the data sheets for the reporting limits for each compound.

Requirement	***NIOSH 5515***	***ATL Modifications***
Target compounds	List includes Benzo(e)pyrene.	Standard list does not include Benzo(e)pyrene.
Determination of Optimal Solvent	Test is performed on sample filters to determine optimal solvent: Acetonitrile, Benzene, Cyclohexane, or Methylene Chloride.	Methylene Chloride is used as the extraction solvent for all samples.
Standard preparation	Standards are prepared in Toluene using neat compounds.	Commercially available standard mixes in methylene chloride are used
Calibration range	Suggested range of 0.005 to 5 ug/mL.	Range is approximately 1.0 to 160 ug/mL.
Recovery study for filter	For each filter lot, spike 4 filters at each of the 5 calibration levels. Extract, analyze, and calculate recovery.	Not performed unless requested
Laboratory Control Spikes	With each analytical batch, spike and extract duplicate filters and tubes If recovery varies by more than +/-5% from the recovery and desorption efficiency study results, than repeat the studies.	Spike filter and tube with each batch Acceptance criterion is 50%-150%
Lab Blank	Analyze at least three field blanks for each sample medium. Average blank level is subtracted from the sample results.	One lab blank is analyzed per batch; no blank subtraction is performed.
Concentration calculations	Results are corrected for %Recovery and desorption efficiency.	No correction of results performed. A copy of the desorption study is available upon request.
Units	The air concentration in mg/m3 is reported.	Standard reporting unit is mass concentration (ug).
Detector	Flame Ionization Detector (FID)	Mass Spectrometer (MS)

Receiving Notes

A Temperature Blank was included with in shipment. Temperature was measured and was not within 4 degrees C. +/- 2 degrees. Coolant was present. The client was notified via the login email and the analysis proceeded.

Analytical Notes

A tube and a filter were received for each sample. The filter and sorbent were analyzed separately, and then the results for each analyte were additively combined and reported as a single concentration.

The front and back portions of each tube were extracted separately to monitor for possible breakthrough. There were no target compound hits reported for the front end analysis which implies that no significant breakthrough had occurred during sample collection. Analytical results from only the front tubes were reported since no breakthrough was observed.

Definition of Data Qualifying Flags

Six qualifiers may have been used on the data analysis sheets and indicate as follows:
B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the detection limit

File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Table 1								
Client Sample ID	Lab Sample ID	Date Collected	Date Received	Date Extracted	Sample Holding Time (Days)	Date Analyzed	Sample Extract Holding Time (Days)	Sample Condition
T-PAH-Comp.	0206241-01A	6/12/2002	6/14/2002	6/18/2002	6	6/20/2002	2	Good
Blank-Trip	0206241-02A	6/12/2002	NA	6/18/2002	6	6/20/2002	2	Good
LCS	0206241-03A	NA	NA	6/18/2002	NA	6/20/2002	2	Good
Lab Blank	0206241-04A	NA	NA	6/18/2002	NA	6/20/2002	2	Good

Sample Results and Raw Data

AIR TOXICS LTD.

SAMPLE NAME: T-PAH-Comp.

ID#: 0206241-01A

MODIFIED NIOSH METHOD 5515 GC/MS

File Name:	y061937	Date of Collection: 6/12/02
Dil. Factor:	2.00	Date of Analysis: 6/20/02
		Date of Extraction: 6/18/02

Compound	Rpt. Limit (ug)	Amount (ug)
Naphthalene	2.0	Not Detected
2-Methylnaphthalene	2.0	Not Detected
2-Chloronaphthalene	2.0	Not Detected
Acenaphthene	2.0	Not Detected
Acenaphthylene	2.0	Not Detected
Fluorene	2.0	Not Detected
Phenanthrene	2.0	Not Detected
Anthracene	2.0	Not Detected
Fluoranthene	2.0	Not Detected
Pyrene	2.0	Not Detected
Chrysene	2.0	Not Detected
Benzo(a)anthracene	2.0	Not Detected
Benzo(b)fluoranthene	2.0	Not Detected
Benzo(k)fluoranthene	2.0	Not Detected
Benzo(a)pyrene	2.0	Not Detected
Indeno(1,2,3-c,d)pyrene	2.0	Not Detected
Dibenz(a,h)anthracene	2.0	Not Detected
Benzo(g,h,i)perylene	2.0	Not Detected

Container Type: NIOSH Tubes XAD-2 w/Filter

Surrogates	%Recovery	Method Limits
2-Fluorobiphenyl	104	50-150
Terphenyl-d14	104	50-150

eCVP

Electronic Comprehensive Validation Package

WO# 0206243

Air Toxics Ltd.

180 Blue Ravine Road Ste. B
Folsom, CA 95630
Phone: 916/985-1000
Fax: 916/985-1020
eMail: atl@airtoxics.com
www.airtoxics.com

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

COMPREHENSIVE VALIDATION PACKAGE

Modified VOST 5041A/8260B

INVENTORY SHEET

Work Order #: 0206243

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b Target Compound Raw Data		
-Internal Standard Area and Retenetion Time Summary		
-Surrogate Recovery Summary (If Applicable)		
-Chromatogram(s) and Ion Profiles (If Applicable)		
3. QC Results and Raw Data		
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Comments:

Completed by:

Brad Mosakowski	Brad Mosakowski / Document Control	7/3/02
(Signature)	(Print Name & Title)	(Date)

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0206243

Work Order Summary

CLIENT:	Mr. Tom Gerstle Environmental Quality Management, Inc 1800 Carillon Boulevard Cincinnati, OH 45240	**BILL TO:**	Mr. Tom Gerstle Environmental Quality Management, Inc 1800 Carillon Boulevard Cincinnati, OH 45240
PHONE:	800-229-7495 x 251	**P.O. #**	3966
FAX:	513-825-7495	**PROJECT #**	30174.0003.002 Travis Air Force Base
DATE RECEIVED:	6/14/2002	**CONTACT:**	DeDe Dodge
DATE COMPLETED:	6/26/2002		

FRACTION #	NAME	TEST
01A	T-0030-Comp Tenax	Modified VOST 5041A/8260B
01B	T-0030-Comp Tenax-Charcoal	Modified VOST 5041A/8260B
02A	Field Blank Tenax	Modified VOST 5041A/8260B
02B	Field Blank Tenax-Charcoal	Modified VOST 5041A/8260B
03A	Trip Blank Tenax	Modified VOST 5041A/8260B
03B	Trip Blank Tenax-Charcoal	Modified VOST 5041A/8260B
04A	Lab Blank	Modified VOST 5041A/8260B
05A	LCS	Modified VOST 5041A/8260B

CERTIFIED BY: Linda d. Fruman

Laboratory Director

DATE: 06/27/02

Certfication numbers: CA NELAP - 02110CA, NY NELAP - 11291, UT NELAP - 9166389892, LA NELAP/LELAP- AI 30763
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 01/01/02, Expiration date: 06/30/02

Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 (800) 985-5955 FAX (916) 985-1020

LABORATORY NARRATIVE
VOST 5041A
Environmental Quality Management, Inc.
Workorder# 0206243

Six VOST Pair samples were received on June 14, 2002. The laboratory performed the analysis via Modified EPA SW-846 Method 5041A using GC/MS in the full scan mode. VOST sorbent tubes are thermally desorbed at 180 degrees centrigrade for ten minutes by UHP helium carrier gas. The gas stream is then bubbled through 5 mL of organic free water and trapped on the sorbent trap of the purge and trap system. The trap is thermally desorbed to elute the components into the GC/MS system for further separation. See the data sheets for the reporting limits for each compound.

Requirement	*VOST 5041A*	*ATL Modifications*
Batch certification	Blanks from the same media as samples	Analysis of set of cartridges prior to onset of any project;Sampling media provided by the client is batch certified ahead of time, only if client provides blank cartridges.
Tenax/tenax charcoal tube analysis	Separate tube analysis	Tubes are desorbed and analyzed simultaneously, unless specified by client
Method blank	Cartridges from the same media batches as the samples	Cartridges used for daily method blank may or may not be from the same batch or sampling media.
Connection between cartridge thermal desorption apparatus & sample purge vessel	PTFE 1/16" Teflon tubing	Heated, 1/16" nickel line
Flow rates	40 mL/min	40-45 mL/min
Storage of standards	Amber bottles with PTFE-lined screw caps	Clear vials capped with PTFE mininert valves
Calibration criteria for non-CCCs	RSD </= 15% for all non-CCCs	RSD </= 30% for some compounds: acetone, bromoform, vinyl acetate, bromomethane, chloromethane, 1,1,2,2-tetracholoroethane, & 1,2,3-trichloropropane; for some non-5041A compounds
BFB injection	Method 5041A - purge through water; Method 8260B - direct injection	Direct injection onto the column
Saturation level concentrations	Not specified	Samples desorbed into Tedlar bags

Receiving Notes

A Temperature Blank was included with the shipment. Temperature was measured and was not within 4 degrees C, +/- 2 degrees. Coolant in the form of blue ice was present. The client was notified via the login email and the analysis proceeded.

Analytical Notes

The recovery of internal standard Chlorobenzene-d5 and surrogate 4-Bromofluorobenzene in sample T-0030-Comp Tenax was outside control limits due to high level hydrocarbon matrix interference. It is not possible to re-run to confirm matrix or dilute for matrix using sorbent tube media. The un-subtracted raw spectra is provided to confirm the matrix interference. Data is reported as qualified.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the detection limit.

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

Table 1

Client Sample ID	Lab Sample ID	Date Collected	Date Received	Date Extracted	Sample Holding Time (Days)	Date Analyzed	Sample Extract Holding Time (Days)	Sample Condition
T-0030-Comp Tenax	0206243-01A	6/12/2002	6/14/2002	NA	3	6/15/2002	NA	Good
T-0030-Comp Tenax-Char	0206243-01B	6/12/2002	6/14/2002	NA	3	6/15/2002	NA	Good
Field Blank Tenax	0206243-02A	6/12/2002	NA	NA	3	6/15/2002	NA	Good
Field Blank Tenax-Charco	0206243-02B	6/12/2002	NA	NA	3	6/15/2002	NA	Good
Trip Blank Tenax	0206243-03A	6/12/2002	NA	NA	3	6/15/2002	NA	Good
Trip Blank Tenax-Charcoa	0206243-03B	6/12/2002	NA	NA	3	6/15/2002	NA	Good
Lab Blank	0206243-04A	NA	NA	NA	NA	6/15/2002	NA	Good
LCS	0206243-05A	NA	NA	NA	NA	6/15/2002	NA	Good

Sample Results and Raw Data

AIR TOXICS LTD.

SAMPLE NAME: T-0030-Comp Tenax

ID#: 0206243-01A

MODIFIED VOST 5041A/8260B

File Name:	n061514	Date of Collection: 6/12/02	
Dil. Factor:	1.00	Date of Analysis: 6/15/02	

Compound	Rpt. Limit (ng)	Amount (ng)
Chloromethane	10	Not Detected
Bromomethane	10	Not Detected
Chloroethane	10	Not Detected
Freon 11	10	Not Detected
1,1-Dichloroethene	10	Not Detected
Carbon Disulfide	10	Not Detected
Acetone	50	460
Methylene Chloride	10	77
trans-1,2-Dichloroethene	10	Not Detected
1,1-Dichloroethane	10	Not Detected
Vinyl Acetate	50	Not Detected
cis-1,2-Dichloroethene	10	Not Detected
2-Butanone (Methyl Ethyl Ketone)	50	280
Chloroform	10	Not Detected
1,1,1-Trichloroethane	10	Not Detected
Carbon Tetrachloride	10	Not Detected
Benzene	10	4500 E
1,2-Dichloroethane	10	Not Detected
Trichloroethene	10	Not Detected
1,2-Dichloropropane	10	Not Detected
Bromodichloromethane	10	Not Detected
cis-1,3-Dichloropropene	10	Not Detected
trans-1,3-Dichloropropene	10	Not Detected
4-Methyl-2-pentanone	50	Not Detected
Toluene	10	2800 E
1,1,2-Trichloroethane	10	Not Detected
Tetrachloroethene	10	Not Detected
2-Hexanone	50	Not Detected
Dibromochloromethane	10	Not Detected
Chlorobenzene	10	Not Detected
Ethyl Benzene	10	570
m,p-Xylene	10	1900
o-Xylene	10	760
Styrene	10	37
Bromoform	10	Not Detected
1,1,2,2-Tetrachloroethane	10	Not Detected
1,3-Butadiene	50	Not Detected

E = Exceeds instrument calibration range.
Q = Exceeds Quality Control limits of 70% to 130%, due to matrix effects
Container Type: VOST Pair

AIR TOXICS LTD.

SAMPLE NAME: T-0030-Comp Tenax

ID#: 0206243-01A

MODIFIED VOST 5041A/8260B

File Name:	n061514	Date of Collection:	6/12/02
Dil. Factor:	1.00	Date of Analysis:	6/15/02

Surrogates	%Recovery	Method Limits
Dibromofluoromethane	94	70-130
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	94	70-130
4-Bromofluorobenzene	157 Q	70-130

EQ Environmental Quality Management, Inc.

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Reference Document No. A- 4216
Page 1 of ____

Project Name: Elmendorf Air Force Base
Project Number: 30174.0003.002
Project Manager: Tom Gerstle
Sample Team Leader: Ron Kolde

Lab Destination: Air Toxics Ltd
Lab Contact/Phone: Dale Dodge 916-985-1000
Lab Purchase Order No.: 3966
Carrier/Waybill No.: ____

Report to: Tom Gerstle
EQ
1800 Carillon Boulevard
Cincinnati Ohio 45240
Bill to: Same

ONE CONTAINER PER LINE

Sample Number	Sample Description/Type	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Analytical Method/(Parameters)	Condition on Receipt (Lab)
sample E-0011-Comp	DNPH Solution	6/25/02	Glass	UNK		Aldehydes + Ketones	
samples Trip Blanks	DNPH, DI H2O	6/26/02	Glass	UNK		by EPA Method	
	and MeCl2					0011	

Special Instructions:

Possible Hazard Identification:
Non-hazard ☐ Flammable ☐ Skin Irritant ☒ Other ____

Sample Disposal:
Return to Client ☐ Disposal by Lab ☒ Archive 6 (mos.)

Turnaround Time Required: As per Method 0011
Normal ☒ Rush ☐ Results Required by ____

QA Requirements: As per Method 0011

1. Relinquished by (Signature/Affiliation): Ron J Kolde Date: 6/27/02 Time:
1. Received by (Signature/Affiliation): Date: ____ Time:

2. Relinquished by (Signature/Affiliation): Date: ____ Time:
2. Received by (Signature/Affiliation): Date: ____ Time:

Comments:

EQ *Environmental Quality Management, Inc.*

EQ Environmental Quality Management, Inc.

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Reference Document No. ________
Page 1 of ___

Project Name: 86 Generator Testing
Project Number: 030174.0003.002
Project Manager: Tom Gerstle
Sample Team Leader: Ron Kolde

Lab Destination: First Analytical
Lab Contact/Phone: Bill Wadlin
Lab Purchase Order No. ________
Carrier/Waybill No. ________

Report to: Ron Kolde, EQ, 1800 Carillon Blvd, Cincinnati Oh 45240
Bill to: Same

ONE CONTAINER PER LINE

Sample Number	Sample Description/Type	Date/Time Collected	Container Type	Sample Volume	Preservative	Requested Analytical Method/(Parameters)	Condition of Receipt (Lab)
T-10-5-1	MeCl2 rinse;		Glass/	UNK	N/A	EPA Method 202	
T-10-5-2	DI H2O Back ½		Plastic	↓	↓	for Condensible	
T-10-5-3	for each					Particulate Matter	
T-25-5-1	sample					↓	
T-25-5-2							

Special Instructions: 2 Fractions for each test run – MeCl2 rinse + DI H2O Back ½

Possible Hazard Identification: Non-hazard ☐ Flammable ☐ Skin Irritant ☒ Other ________

Sample Disposal: Return to Client ☐ Disposal by Lab ☑ Archive 3 (mos.)

Turnaround Time Required: Normal ☒ Rush ☐ Results Required by ______

QA Requirements: per EPA Method 202

1. Relinquished by (Signature/Affiliation): Ron Kolde EQ Date: 7/14/02 Time: ________
1. Received by (Signature/Affiliation): ________ Date: ________ Time: ________

2. Relinquished by (Signature/Affiliation): ________ Date: ________ Time: ________
2. Received by (Signature/Affiliation): ________ Date: ________ Time: ________

Comments:

\\NETSERVER\ADMIN\Forms\Forms\Emission Testing\Chain of Custody.doc

Environmental Quality Management, Inc.

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD (cont.)

Reference Document No. ______
Page 2 of 3

Project Name 86 Generator Testing   Project No. 030174.0003.002   Sample Shipment Date 7/15/02

ONE CONTAINER PER LINE

Sample Number	Sample Description/Type	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Analytical Method/(Parameters)	Condition on Receipt (Lab)
T-25-5-3	MeCl2 rinse;		Glass/	UNK	N/A	EPA Method 202	
T-50-5-1	DI H2O Back ½		Plastic			for Condensible	
T-50-5-2	for each					particulate	
T-50-5-3	sample run					matter	
T-75-5-1							
T-75-5-2							
T-75-5-3							
T-100-5-1							
T-100-5-2							
T-100-5-3							
MeCl2 Blank							
DI H2O Blank							
E-10-5-1							
E-10-5-2							
E-10-5-3							
E-25-5-1							
E-25-5-2							
E-25-5-2							
E-50-5-1							

Environmental Quality Management, Inc.

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD (cont.)

Reference Document No. ______
Page 3 of 3

Project Name 9b Generator Testing   Project No. 030174.0003.002   Sample Shipment Date 7/15/02

ONE CONTAINER PER LINE

Sample Number	Sample Description/Type	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Analytical Method/(Parameters)	Condition on Receipt (Lab)
E-50-5-2	$MeCl_2$ rinse;		Glass/	UNK	NA	EPA Method 202	
E-50-5-3	① I H_2O Back ½		Plastic			for condensible	
E-75-5-1	for each sample					particulate matter	
E-75-5-2	run						
E-75-5-3							
E-100-5-1							
E-100-5-2							
E-100-5-3							

APPENDIX E

AGSE PERFORMANCE DATA

CLEAN CAM TECHNOLOGY –86 FIELD DEMONSTRATION
QUARTERLY MEETING AGENDA
25 FEBRUARY 2002
1400 HOURS, EASTERN TIME ZONE

I. Introductions

II. Engine Rebuild Update

A. 2 Detroit Diesel (4L-71N) motors (ID numbers 4A268635 and 4A269999) and 1 complete AGSE (Hobart model) were shipped to Clean Cam Technology Systems (CCTS) in Bakersfield, California for retrofit on 4 January 2002.

B. The motors were rebuilt, shipped to Elmendorf AFB, and were received on 28 January 2002.

C. The motors were installed into 2 AGSE (Hollinsworth models) and several problems were noted:
   1. The turbo oil drain back line was too close to the exhaust. The extreme heat would seize the oil and clog the drain line.
   2. The either bottle was blocked by the new air box for placement.
   3. The exhaust exit was too close to the hand brake and the diversion towards the ground caused damage to the asphalt during operation.

D. The problems were discussed with CCTS and several solutions were provided:
   1. The turbo drain line can be connected to the rear of the engine near the fly wheel. This will keep the line away from the exhaust.
   2. CCTS will attempt to make the airbox smaller to allow for normal either bottle placement. Also, a bracket can be fabricated to the rear of the airbox for the ether bottle.
   3. The exhaust routing will be modified so that it does not interfere with the hand brake and directs the exhaust parallel to the ground.

E. Discuss wet stacking issues.

III. Rebuild Configuration for 2 Remaining Motors

A. 2 motors arrived at CCTS on 12 February 2002.
   1. Should the rebuild route the turbo over the valve cover and eliminate the problems noted or keep the existing turbo routing and solve the problems noted?
   2. One of the motors had major damage upon arrival (cracked head, broken crankshaft, oil distribution pipe is broken, flywheel housing is broken). The second motor for rebuild will come from the AGSE set.

B. What is the AGSE type at Travis AFB (Hobart of Hollinsworth)?
   1. Can Travis AFB send CCTS some electronic photos of the AGSE?

C. Rebuild should be completed on both engines on 12 March 2002.

IV. Tentative Emission Measurement Dates

A. Tentative schedule is to ship sampling equipment to Travis AFB, conduct testing (approx. 6 days), ship equipment to Elmendorf AFB (approx. 6 days), conduct testing at Elmendorf AFB (approx. 6 days). EQ may drive equipment to maintain control.

B. Is driving to Elmendorf AFB in the winter possible?

V. Review Sampling Plan Comment Items

A. Refer to the fuel return line and AGSE maintenance log items in the attached email from Mr. William Likos WRALC/LEE.

Subject: Clean Cam Travis AFB
Date: Thu, 26 Dec 2002 10:45:45 -0600
X-MS-Has-Attach:
X-MS-TNEF-Correlator:
Thread-Topic: Clean Cam Travis AFB
Thread-Index: AcKs/i+++PLFR8CFS2K6LDwZ2iOg3g==
Priority: Urgent
Importance: high
From: "Kramer William H MSgt 60 EMS/LGMGR" <William Kramer@travis af.mil>
To: "Tom Gerstle" <tgerstle@eqm.com>
Cc: "Salvitti Ronald E Civ 60 EMS/LGMG" <ronald.salvitti1@travis.af.mil>
X-OriginalArrivalTime: 26 Dec 2002 16:45:46.0846 (UTC) FILETIME=[3D36AFE0:01C2ACFE]

Good morning Tom, our organization started running JP-8 in the DG87 test unit and we are experiencing problems The list below is some of the problems we are experiencing:

1 Engine very unstable at idle speed (cold)
2 Excessive white smoke at idle speeds especially when (cold)
3. Low engine operating temperatures below 180F under full load
4 High engine oil consumption rate, over two to three quarts for every tank of fuel
5. There appears to be too much petroleum product leaving the exhaust system at idle We ran the unit in the rain and had to recover oil byproducts from the area

6 The unit still load tests fine but if we continue to run JP-8 I'm confident that will change
7. DG87 is brought in from the flight line regularly on a red X for excessive smoke
8 We see DG87 regularly for discrepancies related to the JP-8 test
9 Unit takes longer to warm-up at idle speed

Tom I want to start running DF-2 in this unit to cut down the maintenance man hours I'm devoting to the JP-8 test. I don't see a quick solution to rectify the deficiencies and want to avoid premature engine failure This unit ran at full song before the JP-8 test and showed positive results, right now, it appears that JP-8 is not compatible with the unit under test. Please respond ASAP and provide your inputs on converting back to DF-2.

Respectfully, MSgt Kramer
DSN: 837-0940
COMM: 707-424-0940

From: "Don Fairchild" <donfairchild@gohighspeed.com>
To: <Kent.johnson@elemdorf.af.mil>
Cc: <tgerstle@eqm.com>
Subject: -86 generator engines
Date: Sat, 13 Apr 2002 10:38:55 -0700
X-Mailer: Microsoft Outlook IMO, Build 9.0.2416 (9.0.2910.0)
Importance: Normal

Msg Johnson
we have installed our test engine on the dyno to find out what is going on with the engines you have in Alaska. we have found out that the turbo will not put out the required amount of air to the engine in its current location. we moved the turbo back on top of the engine and it works as intended we also believe that with the turbo down on the side of the engine we have caused internal damage to the engine and therefore the engine will never perform as intended. we are therefore requesting you remove the engines and return them to us in California in order that we may disassemble inspect and correct any defects we may find, and return the engines to you as soon as possiable we regret any inconvenience this has or will cause you.

Don Fairchild
clean cam technology systems
Bakersfield calif.
(661)391-4520 office
(661)391-4525 fax
donfairchild@gohighspeed.com

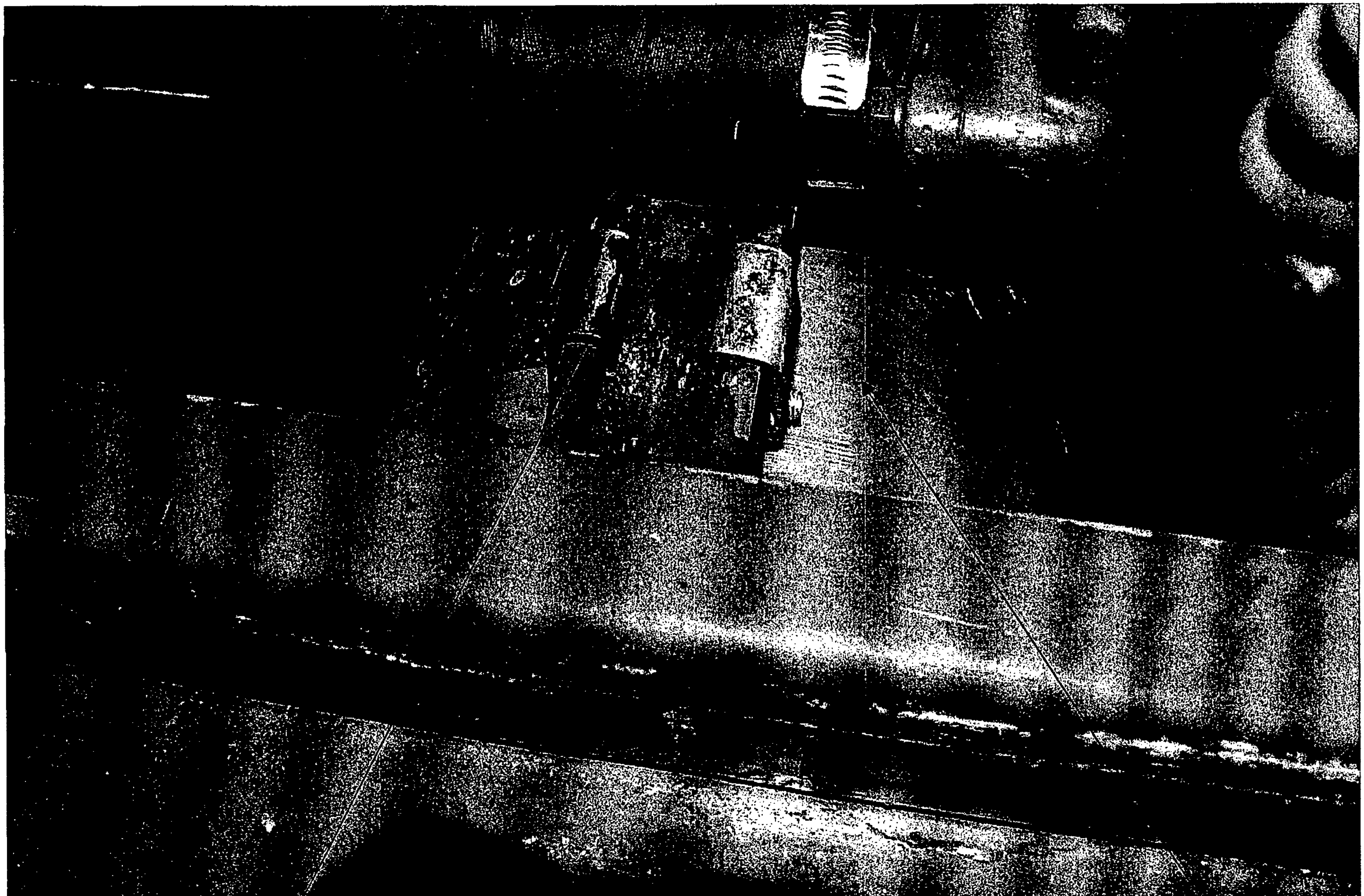
From: Wade Mark D Contr AFIERA/RSEQ <Mark D Wade@brooks af.mil>
To: "T Gerstle (E-mail)" <Tgerstle@eqm com>
Subject: FW: -86 generators
Date: Wed, 29 May 2002 07:50:22 -0500
X-Mailer Internet Mail Service (5.5.2653.19)

MARK D. WADE
AFIERA/RSEQ
BROOKS AFB TX
DSN: 240-4858, COMMERCIAL (210) 536-4858
FAX DSN 240-3945, COMMERCIAL (210) 536-3945
WEBSITE: https://www.afms.mil/afiera/ead_div.htm

-----Original Message-----
From Don Fairchild [mailto:donfairchild@gohighspeed.com]
Sent: Saturday, May 25, 2002 3:45 PM
To: jeffery barton@elmendorf af.mil
Cc: mark.d.wade@brooks.af.mil
Subject: -86 generators

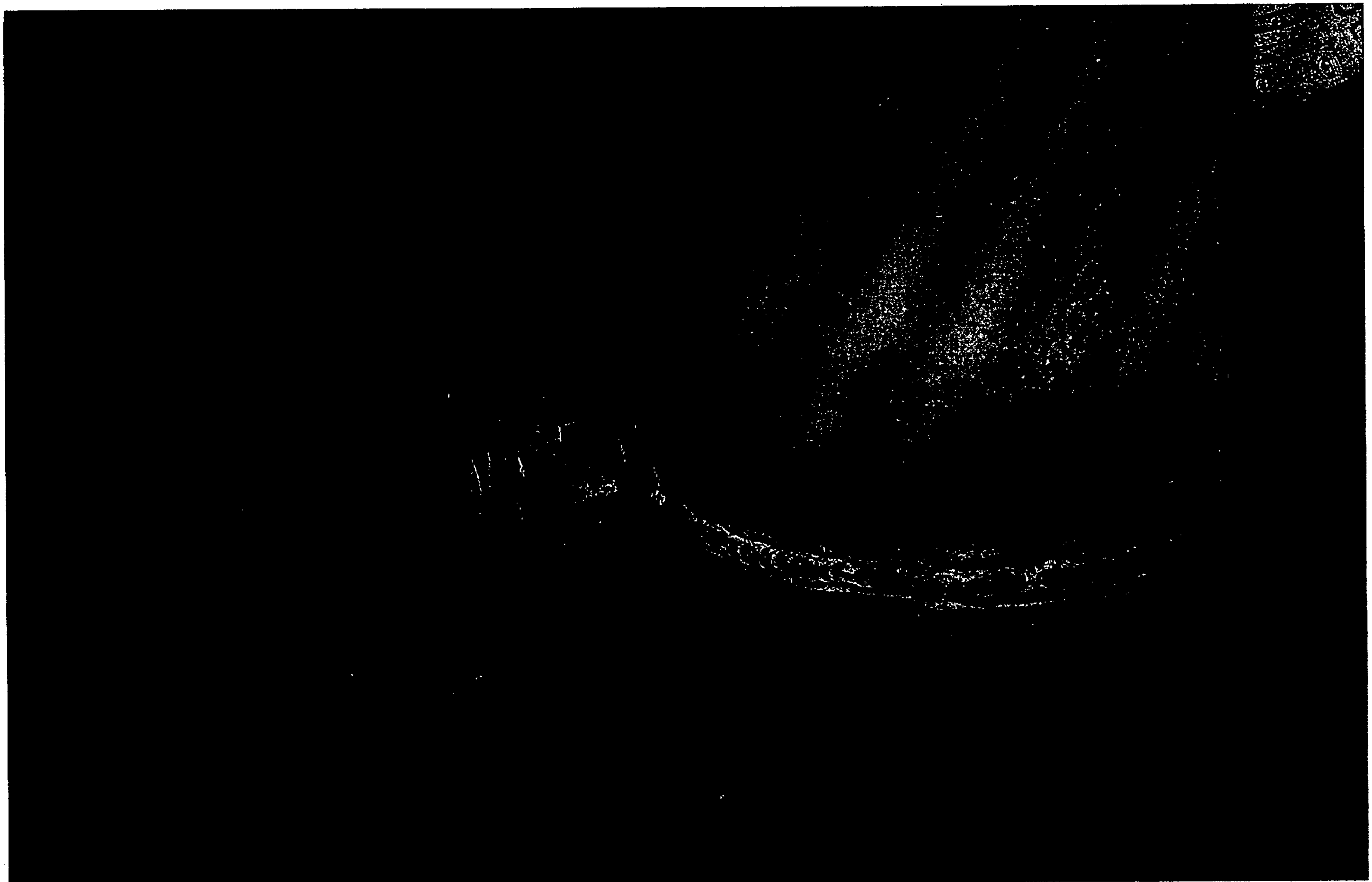
I have the two engines back from Elmendorf. we have found that both turbochargers have had something go through them and destroyed the turbo wheels on the compressor side (intake side) of the turbo. please check and see that all intake hoses, and lines are free of foreign materiel and or dust particles, that all clamps are tight. check the air cleaner element for holes or other objects that may be in the intake system. Remember your training F.O.D foreign objects destroy I will advise on further problems we find in the engines. Thank you for your attention to this matter.

Don Fairchild
ccts
(661)391-4520 office
(661)391-4525 fax
donfairchild@gohighspeed.com

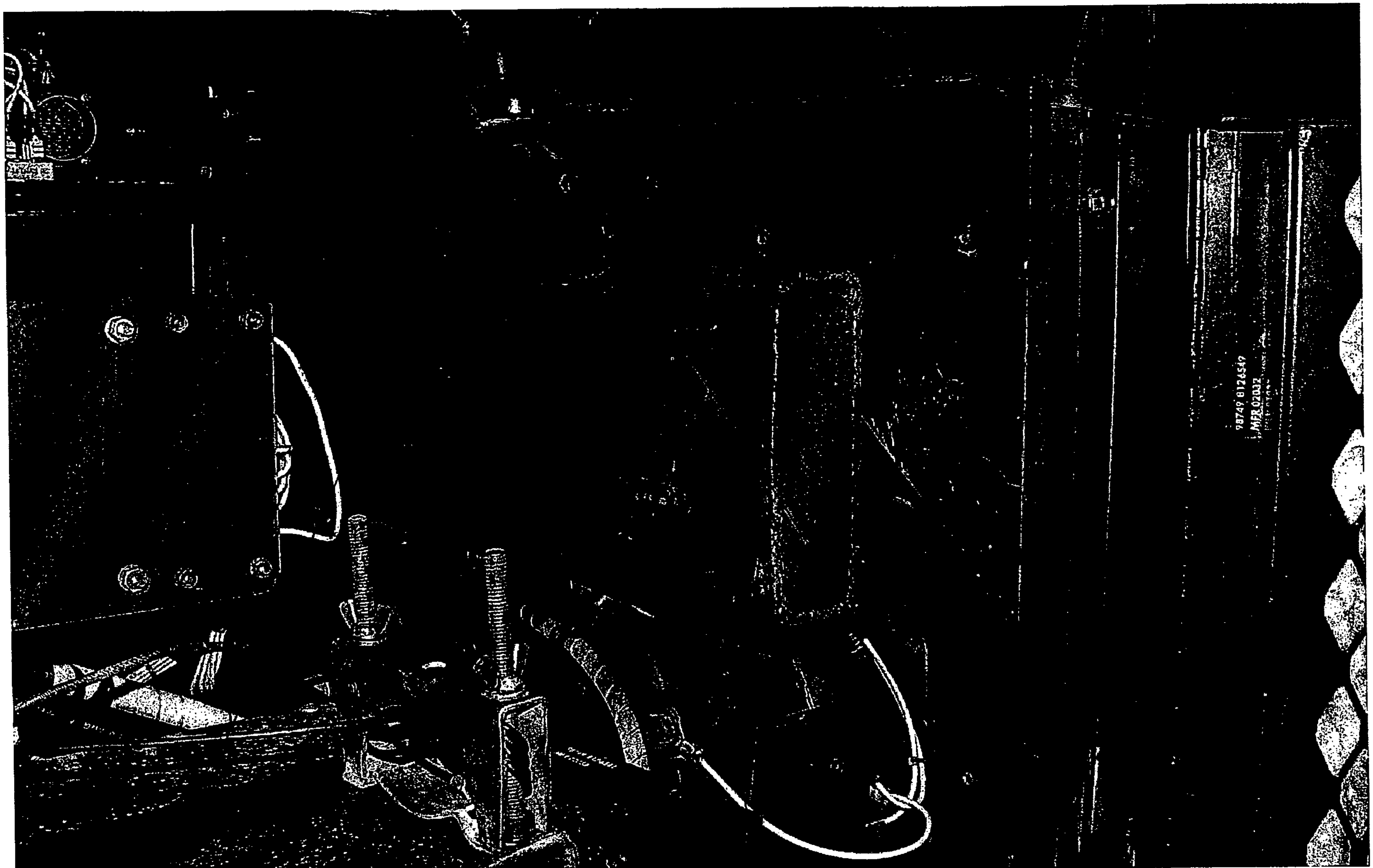


This is the clamp we manufactured for the left side to hold the muffler

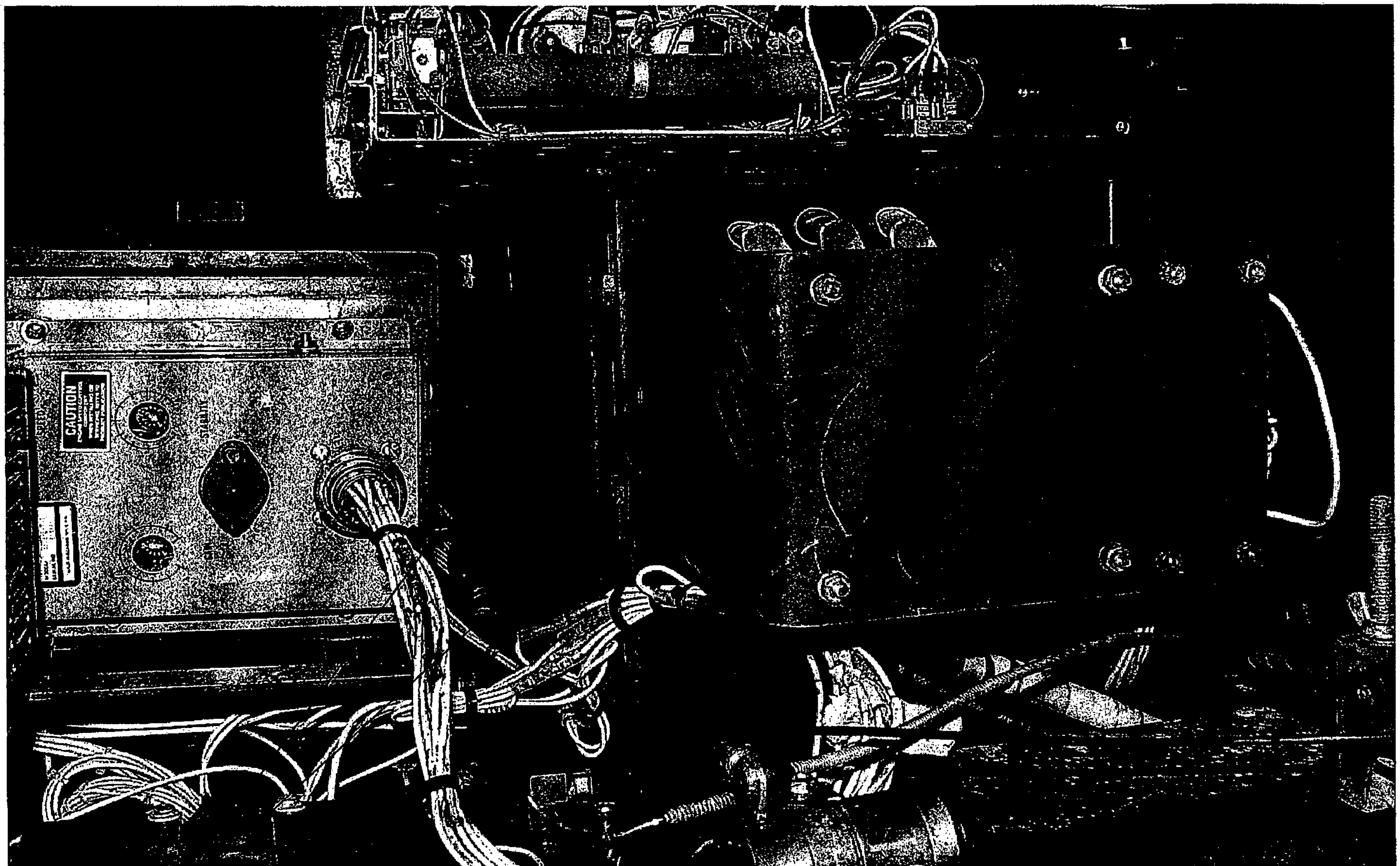
½ inch spacers installed between mount and brake lever assembly to allow clearance between brake rod and muffler



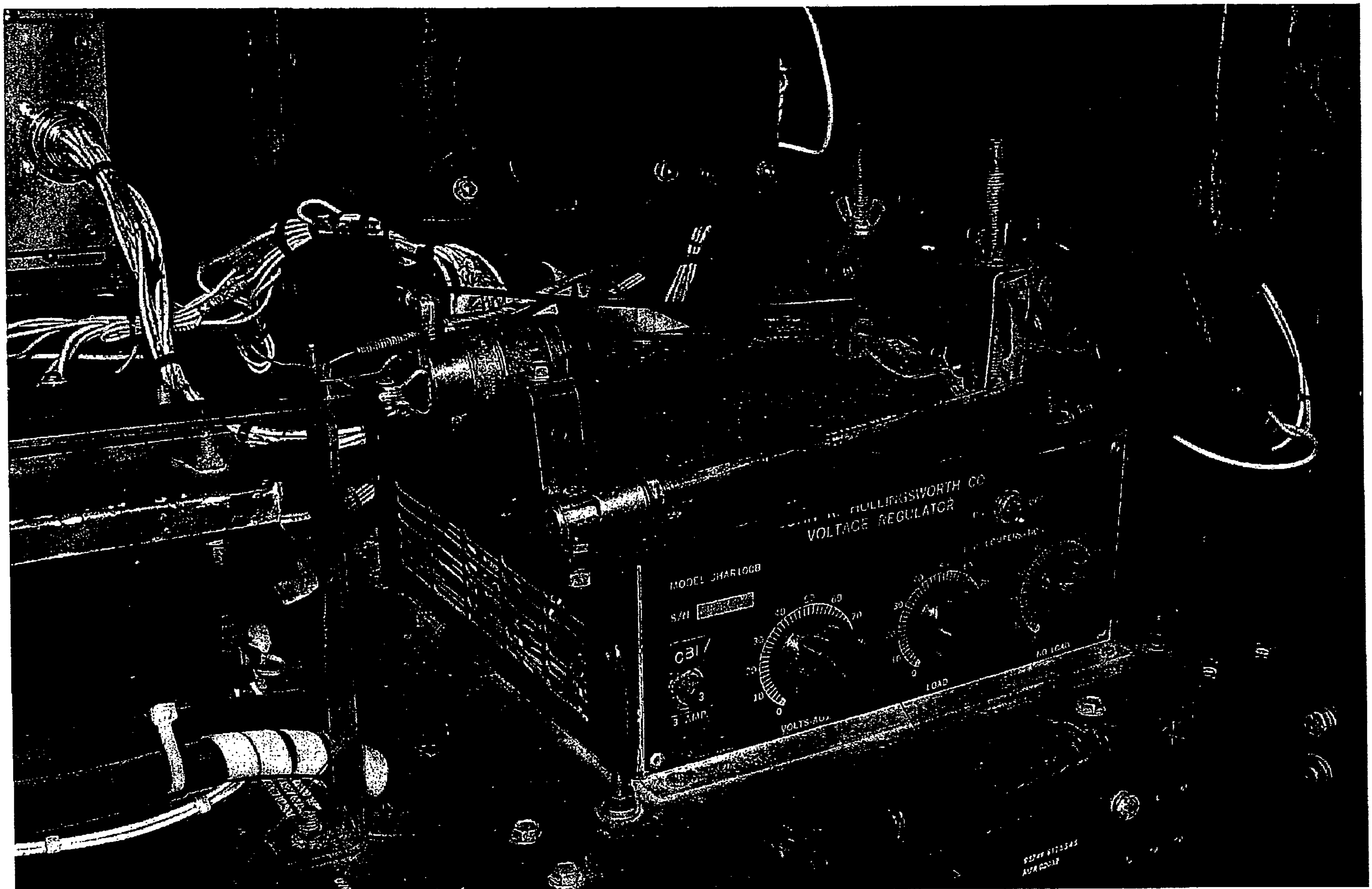
Interference between turbo-charger oil return line (90 degree fitting) and exhaust pipe from turbo-charger



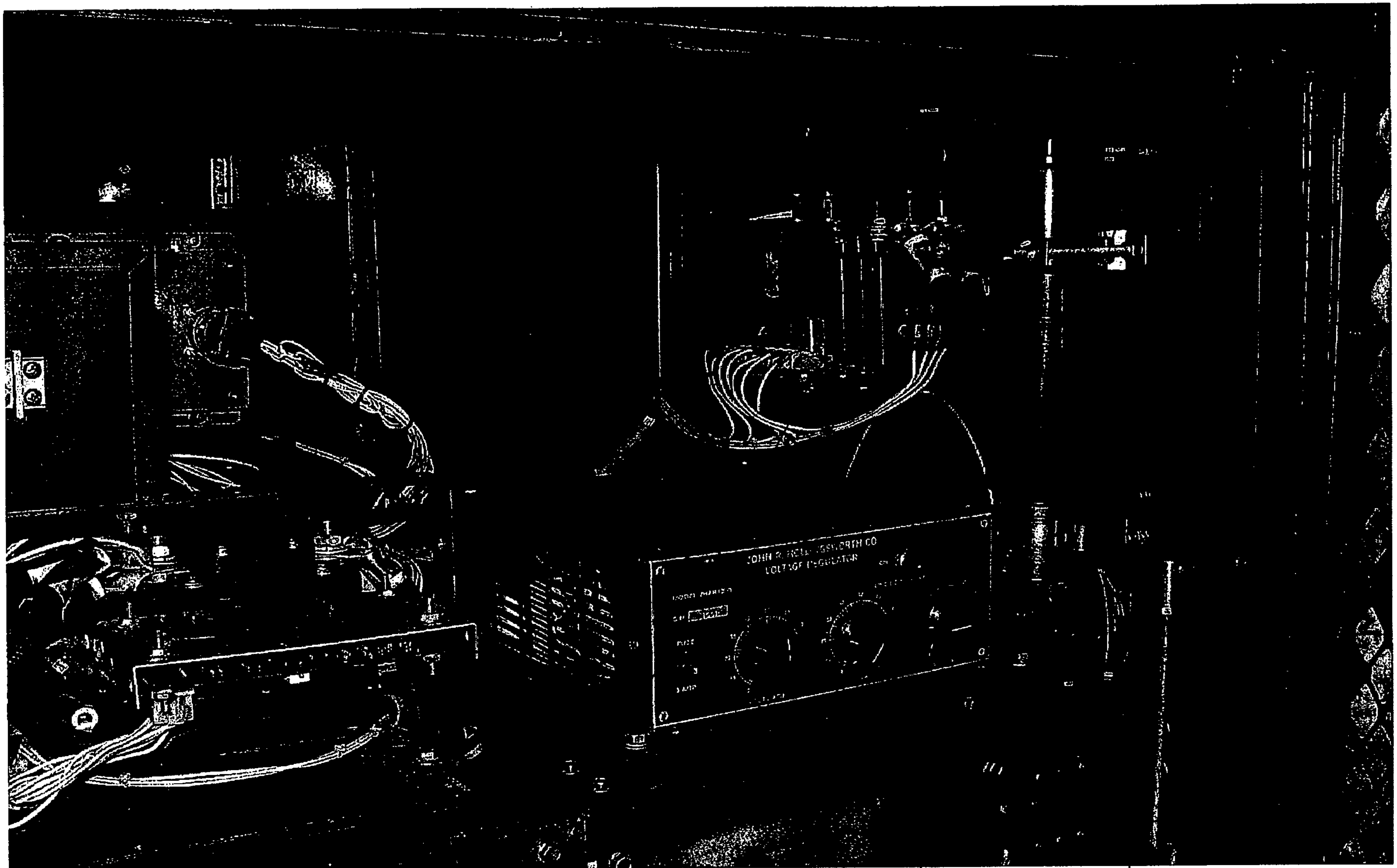
Yoke assembly with existing mounting holes for K-7 contactor and Ether Bottle assembly (note Clean Cam air box behind Yoke)



K-7 Contactor mounted behind air filter box assembly using existing Holes in the contactor mounting bracket



Ether start assembly temporarily mounted on Voltage regulator (bottle removed) Mounting this assembly in this area severely limited



Original configuration of K-7 contactor and Ether start system (with bottle installed) on Yoke assembly. Minimum clearance between Voltage Regulator and Ether bottle

CLEAN CAM ENGINE INSTALLATION PROBLEMS WE DISCOVERED

1. The secondary Clean Cam fuel filter was removed from its mounting location on the engine block. This allows for the installation of the auxiliary starter solenoid. To accomplish this we used the original secondary fuel filter setup from the Hollingsworth –86D Generator set.
2. The muffler hanger bracket located on the left side of the unit had to be fabricated from 1/8 inch steel and bent over the engine mount bracket (see photo # 1).
3. Lowered the brake handle assembly ½ inch to allow for clearance between brake rod and the muffler. This was accomplished by placing ½ inch spacers between the brake mounting plate and the brake handle assembly. Longer bolts were installed, 3/8-by 2-¾ inch bolt to allow for the increased distance (see photo # 2).
4. The oil return line from the turbo-charger goes to the engine block behind the exhaust pipe from the turbo-charger. The 90-degree Clean Cam fitting contacts the exhaust pipe and requires you to force the muffler and exhaust pipe assembly to the right as much as possible to gain some clearance but still leaves them in contact with each other, causing chaffing. (see photo # 3)
5. Relocated the K-7 contactor and the Ether start bottle assembly because the air box assembly of the Clean Cam engine interferes with the original mounting area for these components (see photo # 4). K-7 was easily relocated behind the air filter box assembly by rotating the contactor assembly and utilizing the mount holes. The Ether start bottle has nowhere to be relocated, as it will interfere with the voltage regulator if we attempted to make a bracket that would attach it to its original mounting area. Photos # 5 and # 6 show the relocated K-7 contactor and the temporary mounting of the Ether start bottle. Photo # 7 shows the original configuration of the K-7 contactor and the Ether start bottle assembly.
6. A tee fitting had to be added to the oil feed line of the blower bearings for the supercharger. This was needed to attach the oil line for the oil pressure switch and gauge located behind the engine control panel.
7. During the operational/functional check of the unit we noticed (after applying a 260 Amp, 3 Phase balanced load with a .8 power factor) the ground asphalt located under the exhaust muffler had softened considerably. The outside temperature at the time was 27 degrees Fahrenheit with snow and ice covering the ground. Another major concern is the closeness of the brake handle to the exhaust outlet and the potential for personnel to severely burn themselves via hot metal surfaces.

From: Wade Mark D Contr AFIERA/RSEQ <Mark D.Wade@brooks.af.mil>
To: "T Gerstle (E-mail)" <Tgerstle@eqm.com>
Subject: FW: A/M32-86 Generator Draft Results
Date: Wed, 25 Sep 2002 07:07:38 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

For your discussion with Gary Green.

-----Original Message-----
From: Davies Richard MSgt 3 EMS/LGMGS
[mailto:Richard.Davies@ELMENDORF.af.mil]
Sent: Tuesday, September 24, 2002 5:07 PM
To: Wade Mark D Contr AFIERA/RSEQ
Cc: Barton Jeffery SSgt 3EMS/LGMG (E-mail); Clarence Mylander (E-mail); Noland David TSgt 3EMS/LGMGS (E-mail); Brault Norman Civ 3EMS/LGMGW
Subject: RE: A/M32-86 Generator Draft Results

Mr. Wade, here are the inputs for our clean cam A/M32A-86D units Additionally, you can remove MSGT Lemay from your mailings He is no longer assigned to 3 EMS. Have a good day

Richard A. Davies, MSgt, USAF
517 CAT Manager

DSN (317) 551-0582
Comm (907) 551-0582
Fax 552-9098

-----Original Message-----
From: Wade Mark D Contr AFIERA/RSEQ [mailto:Mark.D.Wade@brooks.af.mil]
Sent: Monday, September 23, 2002 3:53 AM
To: Likos William E Civ WRALC/LEEE; Muldoon James P 2dLt WRALC/LES-1; Fowler Paula Ms 3CES/CEVQ; Mylander Clarence Mr 3EMS/LGMG; Lemay Michael MSgt 3EMS/LGMG; Labadie John MSgt 60 CRS/LGMG; Davies Richard MSgt 3 EMS/LGMGS; McComb Alesha R Civ WRALC/LESGF
Subject: FW: A/M32-86 Generator Draft Results

For your information. As you can see we are very close to meeting EPA's Tier II nonroad engine standards.

I need an update from both Travis and Elmendorf on how the modified generators are operating and approximately how many hours have the operated since the emission tests Also is there any smoking problems on startup?

-----Original Message-----
From: Tina Dunmoyer [mailto:tdunmoyer@eqm.com]
Sent: Friday, September 20, 2002 3:14 PM
To: mark.d.wade@brooks.af mil; garycgreen@hotmail com
Cc: tgerstle@eqm.com
Subject: A/M32-86 Generator Draft Results

For your information, please find attached a spreadsheet containing criteria and hazardous air pollutant summary emissions tables from the A/M32-86 generator testing completed at Travis AFB and Elmendorf AFB this past summer. Please note that particulate emissions reported include filterable and condensible (aqueous fraction only) fractions.

Thank you

Clean Cam Update 24 Sep 02.doc

TALKING PAPER

ON

–86 GENERATOR CLEAN CAM UPDATE

- Units at Elmendorf, MG13 and MG18 continue to run poorly and smoke excessively during start-up

- MG13 has approximately 150 hrs since emissions test, MG18 approximately 75 hours

- MG13

  -- Excessive smoke on start-up, will not accelerate to governed idle speed until 7 minutes after start, smoke is present throughout idling. Ambient temperature was 50 degrees Fahrenheit

  -- Unit will hold 250 Kva load once warm, however. The unit can only handle a 200 Kva shock load. Engine RPMs droop when a load greater than 200 amps is applied, 60 amps below recommended rated load. Smoke is not visibly significant when running under a load

- MG18

  -- Excessive smoke on start-up, as unit accelerates to idle RPM, smoke clears to a blue smoke. Runs up to governed speed and smoke clears. Ambient temperature was 50 degrees Fahrenheit

  -- Unit holds 250 Kva load with no smoke present. The unit will also hold a 250 Kva shock load without experiencing engine droop.

- Overall, the clean cam engine performance is substandard when compared to a normal A/M32A-86D. The units do not run up as quick and smoke excessively. Furthermore, MG13 fails to hold a rated load of 260 Kva when a shock load is applied

MSgt Davies/3 EMS/LGMGS/317-551-0582/rad/24 Sep 02

Clean Cam Technology Systems
1901 Mineral Court, Suite A • Bakersfield, CA 93308
661.391.4520 • 661.391.4525 (fax)
www.cctskit.com

CCTS
Clean Cam Technology Systems

Febuary15, 2002
Tom Gerstal
Environmental Quality Management

Tom:
I am sending you the dyno sheets and the drawings I made and sent to Elmendorf AFB.
If there is any thing further you need please contact me.

Sincerely,

Don Fairchild

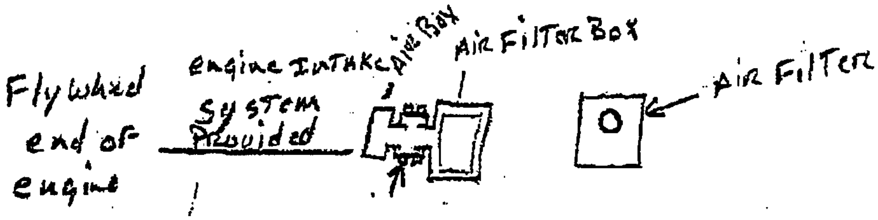
P.S. our unit is a hobart.

6 Pages Including cover

Installation Instruction for the 4L-71T into the –86 generator unit.

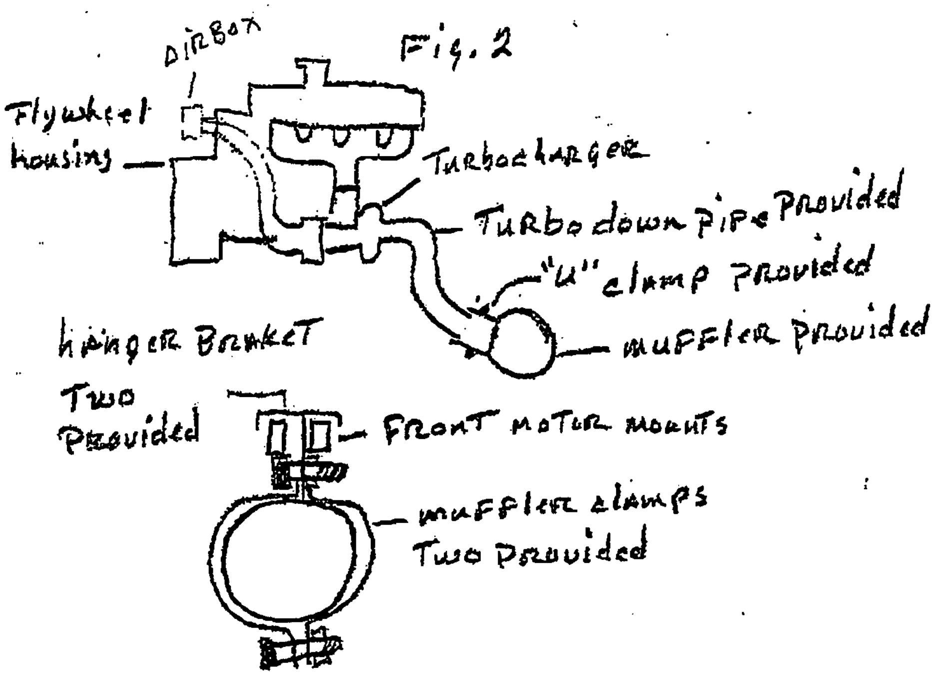
The 4L-71T engine you are about to install has been rebuilt with the finest parts available. PLEASE TAKE CARE WHEN WORKING ON THIS ENGINE.
TO avoid possible injury to yourself or others refer to the Detroit diesel repair manual When servicing this engine.
When installing engine use all items furnished with engine.
Install intake system as indicated in fig.1
Install exhaust system by mounting the muffler cross ways in the frame using the hangers Provided along with the hanger clamps. Be sure to install exhaust "U"clamp on exhaust pipe at the muffler connection as in fig.2

Fig.1



Remove Tape covering Intake opening Prior To engine Installation, Loosen clamps And slide hose and clamps Into proper position ReTighten clamps

Fig. 2



Delaney & Ahlf Diesel Service Inc.

3801 Mercury St
Bakersfield, CA 93308
(805) 322-5084
(805) 321-0488

4717
Clean cam.

ENGINE TEST REPORT

DATE: 1-8-02
REPAIR ORDER NUMBER: 1288
EQUIPTMENT NUMBER:
UNIT NUMBER: 4A238922
MOD NUMBER: 1043-7000
MILEAGE:

A. PRE-STARTING					
1. PRIME LUBE OIL SYSTEM	2. PRIME FUEL SYSTEM	3. ADJ. EXH. VALVES	4. TIME INJECTORS	5. ADJUST GOVERNOR	6. ADJ. INJ. RACKS
—	—	—	—	—	—

B. BASIC ENGINE RUN-IN

TIME AT SPEED	TIME START	TIME STOP	RPM	BHP	WATER TEMP	OIL PRESS
1HR	800	900	1500	152	175	50
1HR	900	1000	1600	160	175	53
1HR	1000	1100	1700	164	170	55
1HR	1100	1200	1800	137	170	58

C. BASIC RUN-IN INSPECT

1. CHECK OIL AT ROCKER ARM MECH	✓
2. INSPECT FOR LUBE OIL LEAKS	✓
3. INSPECT FOR FUEL OIL LEAKS	✓
4. INSPECT FOR WATER LEAKS	✓
5. CHECK AND TIGHTEN ALL EXT. BOLTS	✓

D. INSPECTION AFTER BASIC RUN-IN

1. TIGHTEN CYL. HEAD & ROCKER SHAFT BOLTS	✓	4. ADJUST GOVERNOR GAP	✓
2. ADJUST VALVES (HOT) 13/15	✓	5. ADJUST INJECTOR RACKS	✓
3. TIME INJECTORS 1475	✓	6	

E. FINAL RUN-IN

TIME START	TIME STOP	TOP RPM NO LD	TOP RPM FULL LD	BHP	AIR BOX PRESSURE F/L	EXHAUST BACK PRESSURE F/L	CRANKCASE PRESSURE F/L
200	300	1950	1700		—		—

BLOWER INTAKE RES. - F/L	FUEL OIL PRES. RET. MAN F/L	WATER TEMP FULL LOAD	LUBE OIL TEMP F/L	LUBE OIL PRES. F/L	LUBE OIL PRES. IDLE	IDLE SPEED
—	80	170	—	55	10	600

ENGINE SPECIFICATIONS

BLOCK TYPE & SIZE:	STD	HEAD TYPE:	4VALVE T
CRANK SIZE:	STD	BLOWER TYPE:	STD 180%
CYLINDER LINER TYPE:	STD	INJECTOR TYPE:	9F80
PISTON TYPE:	C/H		

REMARKS:

FINAL RUN OK'D [signature] DYNAMOMETER: #2 DATE 1-17-02

	R.P.M.	TORQUE	TEMP	OP	HP
1	1500	532	175	50	152
2	1600	526	175	53	160
3	1700	506	170	55	164
4	1800	401	170	58	137
5	1950	NO LOAD	170	58	
6					
7					
8					
9					
10					

Delaney & Ahlf Diesel Service Inc.

3901 Mercury St.
Bakersfield, CA 93308
661-322-5064
661-321-0493

CCTS
471TRA

ENGINE TEST REPORT

DATE: 11-28-01
REPAIR ORDER NUMBER 2962
EQUIPMENT NUMBER: #1

UNIT NUMBER: 4A268635
MODEL NUMBER: 10435000
MILEAGE:

A. PRE-STARTING

PRIME LUBE OIL SYSTEM	PRIME FUEL SYSTEM	ADJUST EXHAUST VALVES	TIME INJECTORS	ADJUST GOVERNOR	ADJUST INJECTOR RACKS
—	—	—	—	—	—

B. BASIC ENGINE RUN-IN

TIME AT SPEED	TIME START	TIME STOP	RPM	BHP	WATER TEMP	OIL PRES.
1HR	800	900	1200	151	180	50
1HR	900	10.00	1400	157	180	51
1HR	10.00	1100	1900	168	180	54
1HR	1100	12.00	2000	167	180	55

C. BASIC RUN-IN INSPECTION

1. CHECK OIL AT ROCKER ARM MECH	—
2. INSPECT FOR LUBE OIL LEAKS	—
3. INSPECT FOR FUEL OIL LEAKS	—
4. INSPECT FOR WATER LEAKS	—
5. CHECK & TIGHTEN ALL EXT. BOLTS	—

D. INSPECTION AFTER BASIC RUN-IN

1. TIGHTEN CLY. HEAD & ROCKER SHAFT BOLTS	—	4. ADJUST GOVERNOR GAP	—
2. ADJUST VALVES (HOT) 13/15	—	5. ADJUST INJECTOR RACKS	—
3. TIME INJECTORS 1480	—		

E. FINAL RUN-IN

TIME START	TIME STOP	TOP RPM NO LD	TOP RPM FULL LD	BULK HORSEPOWER	AIR BOX PRESSURE F/L	EXHAUST BACK PRESSURE F/L	CRANKCASE PRESSURE F/L
200	300	2150	2000	167	22 PSI	—	42"

BLOWER INTAKE RES. - F/L	FUEL OIL PRES. RET. MAN F/L	WATER TEMP FULL LOAD	LUBE OIL TEMP F/L	LUBE OIL PRES. F/L	LUBE OIL PRES. IDLE	IDLE SPEED
22 PSI	65	180	—0	50	12	600

ENGINE SPECIFICATIONS

BLOCK TYPE & SIZE:	STD	HEAD TYPE:	4 VALVE TURBO
CRANK SIZE:	STD	BLOWER TYPE:	83% BYPASS
CYLINDER LINER TYPE:	CCTS STD	INJECTOR TYPE:	7670
PISTON TYPE:	CCTS TURBO		

REMARKS: [redacted] RAN 10 HR ON DYNO.
modulator 429 INJ 1480 — 13/15 VALVES.

FINAL RUN OK'D: [signature] DYNAMOMETER: #1 DATE: 1-7-02

	R.P.M.	TORQUE	TEMP	OIL PRES	HORSEPOWER
1	1500	475	186	43	135
2	1600	480	186	45	146
3	1700	469	180	50	151
4	1800	461	180	51	157
5	1900	466	180	54	168
6	2000	440	180	55	167
7	2150	NO	LOAD		
8					
9					
10					
11					
12					
13					
14					
15					

APPENDIX F

QUALITY ASSURANCE/QUALITY CONTROL

CALIBRATION PROCEDURES AND RESULTS

All of the equipment used is calibrated in accordance with the procedures outlined in the *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III* (EPA 600/4-77-027b). The following pages describe these procedures and include the data sheets.

DRY GAS METER AND ORIFICE METER

Dry gas meters and orifices are calibrated in accordance with Section 3.3.2 of the QA Handbook. This procedure involves direct comparison of the dry gas meter to a reference dry test meter. The reference dry test meter is routinely calibrated using a liquid displacement technique. Before its initial use in the field, the metering system is calibrated over the entire range of operation. After each field use, the metering system is calibrated at a single intermediate setting based on the previous field test. Acceptable tolerances for the initial and final gas meter factors and orifice calibration factors are ±0.02 and ±0.20 from average, respectively.

ENVIRONMENTAL QUALITY MANAGEMENT

Box No.: MB-7 Bar Press (Pb): 29.33 in Hg

Date: 3/13/02 Calibrated By: JK

		RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6
DH	Delta H	0.50	0.75	1 00	1 50	2.00	4 00
in Hg	Vacuum	10	10	10	10	10	10
Vw_1	Initial RTM	396.544	408 914	420 547	431.672	442.252	453.255
Vw_2	Final RTM	406.545	418.455	430 645	441.720	452.315	463.235
Vd_1	Initial DGM	51 398	63.784	75.535	86 782	97 489	108 599
Vd_2	Final DGM	61 398	73.885	85.675	96.815	107 525	118 627
Tw	Ave Temp RTM °F	74	74	74	75	75	76
Td	Ave Temp DGM °F	76	78	80	82	84	84
t	Time (min.)	24.0	20.0	17.5	14.5	12.5	9.0
$Vw_2 - Vw_1$	Net Volume RTM	10.001	9.541	10.098	10.048	10.063	9.980
$Vd_2 - Vd_1$	Net Volume DGM	10.000	10.101	10.140	10.033	10.036	10.028
	Y	1 003	0 950	1 005	1.011	1 014	1 000
	dH@	1.656	1.888	1.710	1.783	1.755	1.857

AVERAGE Y =	**1.001**	(Reference meter correction factor of 1 004)			
Average Y Range =		0 981	TO	1.021	**ACCEPT**
AVERAGE dH@ =	**1.775**				
Average dH@ Range =		1 575	TO	1 975	**ACCEPT**

Calculations

Y = (Vw * Pb * (Td + 460)) / (Vd * (Pb + (dHd / 13.6)) * (Tw +460))

dH@ = 0 0317 * dHd / (Pb (Td + 460)) * (((Tw +460) * t) / Vw)^2

ENVIRONMENTAL QUALITY MANAGEMENT

Box No.:	MB7	Bar. Press.(Pb):	29.60	in. Hg
Date:	July 9, 2002	Pretest Gamma:	1.001	
Calibrated By	JK	Pretest dH@:	1.775	
Plant:	·avis/Elmondorf AFB			

		RUN 1	RUN 2	RUN 3
DH	Delta H	3.50	3.50	3.50
in Hg	Vacuum	10.00	10.00	10.00
Vw_1	Initial RTM	650.486	666.935	709.051
Vw_2	Final RTM	666.935	709.051	731.200
Vd_1	Initial DGM	788.905	805.335	847.485
Vd_2	Final DGM	805.335	847.485	869.534
Tw	Ave. Temp RTM °F	68.0	69.0	69.0
Td	Ave. Temp DGM °F	74.0	82.0	83.0
t	Time (min.)	15.0	25.0	21.0
$Vw_2 - Vw_1$	Net Volume RTM	16.449	42.116	22.149
$Vd_2 - Vd_1$	Net Volume DGM	16.430	42.150	22.049
	Y	1.004	1.015	1.022
	dH@	1.627	0.682	1.737

AVERAGE Y = **1.005**

% Difference from Yearly Y = **0.379** **ACCEPT**

AVERAGE dH@ = **1.349**

Calculations

Y = (Vw * Pb * (Td + 460)) / (Vd * (Pb + (dHd / 13.6)) * (Tw +460))

dH@ = 0.0317 * dHd / (Pb (Td + 460)) * (((Tw +460) * time) / Vw)^2

Posttest Dry Gas Meter Calibration Form (English Units)

ENVIRONMENTAL QUALITY MANAGEMENT

Box No.:	MB-4	Bar Press (Pb):	29 60	in. Hg
Date:	December 28, 2001	Calibrated By:	AH	

		RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6
DH	Delta H	0.50	0 75	1 00	1 50	2 00	4.00
in Hg	Vacuum	10	10	10	10	10	10
Vw_1	Initial RTM	818.544	829.341	839 754	850 757	862.383	873.248
Vw_2	Final RTM	829 167	839 528	850 495	862.096	872.806	887 856
Vd_1	Initial DGM	96.934	107.848	118.403	129 530	141 283	152.274
Vd_2	Final DGM	107 679	118.175	129.254	140.982	151.817	167 005
Tw	Ave Temp RTM °F	66	65	66	66	67	66
Td	Ave. Temp DGM °F	69	73	70	75	76	80
t	Time (min.)	25.0	20.0	18.0	16.0	13.0	13.0
$Vw_2 - Vw_1$	Net Volume RTM	10.623	10.187	10 741	11 339	10.423	14.608
$Vd_2 - Vd_1$	Net Volume DGM	10.745	10.327	10.851	11 452	10.534	14.731
	Y	0.993	1 000	0 995	1.003	1.001	1.008
	dH@	1.551	1.601	1.570	1.654	1.726	1.738

AVERAGE Y =	**1.004**	(Reference meter correction factor of 1 004)			
Average Y Range =		0 984	TO	1.024	**ACCEPT**
AVERAGE dH@ =	**1.640**				
Average dH@ Range =		1 440	TO	1.840	**ACCEPT**

Calculations

Y = (Vw * Pb * (Td + 460)) / (Vd * (Pb + (dHd / 13.6)) * (Tw +460))

dH@ = 0.0317 * dHd / (Pb (Td + 460)) * (((Tw +460) * t) / Vw)^2

ENVIRONMENTAL QUALITY MANAGEMENT

Box No.:	MB-4	Bar. Press.(Pb):	29.50	in. Hg
Date:	July 9, 2002	Pretest Gamma:	1.004	
Calibrated By	JK	Pretest dH@:	1.640	
Plant:	·avis/Elmendorf AFB			

		RUN 1	RUN 2	RUN 3
DH	Delta H	2.50	2.50	2.50
in Hg	Vacuum	5.00	5.00	5.00
Vw_1	Initial RTM	578.004	592.451	605.883
Vw_2	Final RTM	592.451	605.883	650.386
Vd_1	Initial DGM	780.785	795.245	808.732
Vd_2	Final DGM	795.245	808.732	854.295
Tw	Ave. Temp RTM ^{o}F	69.0	69.0	69.0
Td	Ave. Temp DGM ^{o}F	75.0	79.0	81.0
t	Time (min.)	16.0	15.0	50.0
Vw_2 - Vw_1	Net Volume RTM	14.447	13.432	44.503
Vd_2 - Vd_1	Net Volume DGM	14.460	13.487	45.563
	Y	1.004	1.008	0.993
	dH@	1.724	1.739	1.754

AVERAGE Y = **0.993**

% Difference from Yearly Y = **-1.094** **ACCEPT**

AVERAGE dH@ = **1.739**

Calculations

Y = (Vw * Pb * (Td + 460)) / (Vd * (Pb + (dHd / 13.6)) * (Tw +460))

dH@ = 0.0317 * dHd / (Pb (Td + 460)) * (((Tw +460) * time) / Vw)^2

Posttest Dry Gas Meter Calibration Form (English Units)

ENVIRONMENTAL QUALITY MANAGEMENT

Date:	1/7/02	Flow Rate:	0.25 l/min
Vost Box Number:	VB-1	Rotameter Setting:	0.3
		Bubble Meter Temp.	72

Run 1

Bubble Meter		Meter Box	
1	256 2	Initial Volume	4579.00
2	256.3	Final Volume	4596.35
3	256.4	Initial Temp.	88
4	256.4	Final Temp.	90
5	256.8	Average Temp.	89
6	256.2	Time:	64
7	256 5	QDGM=	262.699
Average:	**256.38**	Y=	**0.9760**

Run 2

Bubble Meter		Meter Box	
1	256.1	Initial Volume	4560.00
2	256.5	Final Volume	4577.48
3	256 3	Initial Temp.	85
4	256.5	Final Temp.	88
5	256 3	Average Temp.	86.5
6	256.6	Time:	64
7	256.3	QDGM=	265.878
Average:	**256.37**	Y=	**0.9642**

Run 3

Bubble Meter		Meter Box	
1	256.4	Initial Volume	4597.00
2	256	Final Volume	4614.39
3	255.8	Initial Temp.	90
4	256 0	Final Temp.	88
5	256.4	Average Temp.	89
6	256 6	Time:	64
7	256 5	QDGM=	263 305
Average:	**256.24**	Y=	**0.9732**

$QDGM = (((Vm_2 - Vm_1) * TBm^{o}R) / (Tm^{o}R * Time)) * 1000$

Y = Bm Average / QDGM

Average Y= 0.9711

ENVIRONMENTAL QUALITY MANAGEMENT

Date: 1/3/02
Vost Box Number: VB-2

Flow Rate: **0.25 l/min**
Rotameter Setting: 0.3
Bubble Meter Temp. : 70

Run 1			
Bubble Meter		Meter Box	
1	230.5	Initial Volume	4473.00
2	233.1	Final Volume	4476.00
3	233.5	Initial Temp.	87
4	233.5	Final Temp.	87
5	234.4	Average Temp.	87
6	233.7	Time:	15.60
7	233.7	QDGM=	186.331
Average:	**233.20**	Y=	**1.2515**

Run 2			
Bubble Meter		Meter Box	
1	233.7	Initial Volume	4477.00
2	233.7	Final Volume	4480.00
3	233.8	Initial Temp.	87
4	233.4	Final Temp.	87
5	233.5	Average Temp.	87
6	233.3	Time:	16.23
7	233.3	QDGM=	179.098
Average:	**233.53**	Y=	**1.3039**

Run 3			
Bubble Meter		Meter Box	
1	233.1	Initial Volume	4481.00
2	233.1	Final Volume	4484.00
3	233.1	Initial Temp.	87
4	233.1	Final Temp.	87
5	233	Average Temp.	87
6	233	Time:	15.77
7	233.3	QDGM=	184.322
Average:	**233.10**	Y=	**1.2646**

QDGM = $(((Vm_2 - Vm_1) * TBm^{o}R) / (Tm^{o}R * Time)) * 1000$

Y = Bm Average / QDGM

Average Y= 1.2734

DRY GAS THERMOCOUPLES AND IMPINGER THERMOCOUPLES

The dry gas thermocouples are calibrated by comparing them with an ASTM-3 thermometer at approximately 32°F, ambient temperature, and a higher temperature between approximately 100°F and 200°F. The thermocouples agreed within 5°F of the reference thermometer. The impinger thermocouples are checked in a similar manner at approximately 32°F and ambient temperature, and they agreed within 2°F. The thermocouples may be checked at ambient temperature prior to the test series to verify calibration. Calibration data are included in the following Dry Gas Thermometer and Impinger Thermocouple Calibration Data Sheet(s).

ENVIRONMENTAL QUALITY MANAGEMENT

TEMPERATURE SENSOR CALIBRATION DATA FORM FOR METER BOX

DATE: 28-Dec-01

THERMOCOUPLE NUMBER: MB-4

AMBIENT TEMPERATURE: 69 °F

BAROMETRIC PRES.(In.Hg): 29.60

CALIBRATOR: AH

Reference point number	Source[a] (Specify)	Reference Thermometer Temperature, °F	Thermocouple Potentiometer Temperature, °F	Temperature Difference,[b] °F
Inlet 1	Ambient Air	69	69	0
2	Cold Bath	34	34	0
3	Hot Bath	150	147	3
Outlet 1	Ambient Air	69	67	2
2	Cold Bath	34	35	1
3	Hot Bath	150	148	2

ACCEPT

[a]Type of calibration used.

[b]Allowable tolerance $\pm 5°F$

Comments:

ENVIRONMENTAL QUALITY MANAGEMENT

TEMPERATURE SENSOR CALIBRATION DATA FORM FOR METER BOX

DATE: 13-Mar-02

THERMOCOUPLE NUMBER: MB-7

AMBIENT TEMPERATURE: 74 °F

BAROMETRIC PRES.(In.Hg): 29.33

CALIBRATOR: JK

Reference point number	Source[a] (Specify)	Reference Thermometer Temperature,°F	Thermocouple Potentiometer Temperature,°F	Temperature Difference,[b] °F
Inlet 1	Ambient Air	74	72	2
2	Cold Bath	40	39	1
3	Hot Bath	138	134	4
Outlet 1	Ambient Air	74	72	2
2	Cold Bath	40	39	1
3	Hot Bath	138	134	4

ACCEPT

[a]Type of calibration used.

[b]Allowable tolerance ± 5°F

Comments·

ENVIRONMENTAL QUALTIY MANAGEMENT

TEMPERATURE SENSOR CALIBRATION DATA FORM FOR METER BOX

DATE: 2-Jan-02

THERMOCOUPLE NUMBER: VB-1

AMBIENT TEMPERATURE: 67 °F

BAROMETRIC PRES.(In.Hg): 29.60

CALIBRATOR: AH

Reference point number	Source[a] (Specify)	Reference Thermometer Temperature,°F	Thermocouple Potentiometer Temperature,°F	Temperature Difference,[b] °F
Inlet 1	Ambient Air	67	67	0
2	Cold Bath	36	36	0
3	Hot Bath	138	136	2
Outlet 1	Ambient Air	67	67	0
2	Cold Bath	37	37	0
3	Hot Bath	148	148	0

ACCEPT

[a]Type of calibration used

[b]Allowable tolerance ±5°F

Comments:

ENVIRONMENTAL QUALITY MANAGEMENT

TEMPERATURE SENSOR CALIBRATION DATA FORM FOR METER BOX

DATE: 2-Jan-02

THERMOCOUPLE NUMBER: VB-2

AMBIENT TEMPERATURE: 67 °F

BAROMETRIC PRES.(In.Hg): 29.60

CALIBRATOR: AH

Reference point number	Source[a] (Specify)	Reference Thermometer Temperature, °F	Thermocouple Potentiometer Temperature, °F	Temperature Difference,[b] °F
Inlet				
1	Ambient Air	67	66	1
2	Cold Bath	38	38	0
3	Hot Bath	130	130	0
Outlet				
1	Ambient Air	67	67	0
2	Cold Bath	38	38	0
3	Hot Bath	132	131	1

ACCEPT

[a]Type of calibration used.

[b]Allowable tolerance ±5°F

Comments:

ENVIRONMENTAL QUALITY MANAGEMENT

TEMPERATURE SENSOR CALIBRATION DATA FORM FOR SAMPLE HEADS

DATE: 26-Dec-01

Reference point number	Source[a] (Specify)	Reference Thermometer Temperature,°F	Thermocouple Potentiometer Temperature,°F	Temperature Difference,[b] °F	
Sample Head No 1					ACCEPT
1	Ambient Air	68	69	1	
2	Cold Bath	37	37	0	
Sample Head No. 2					ACCEPT
1	Ambient Air	68	68	0	
2	Cold Bath	37	38	1	
Sample Head No. 3					ACCEPT
1	Ambient Air	68	69	1	
2	Cold Bath	36	36	0	
Sample Head No. 4					ACCEPT
1	Ambient Air	68	68	0	
2	Cold Bath	37	38	1	
Sample Head No. 5					ACCEPT
1	Ambient Air	68	69	1	
2	Cold Bath	37	37	0	
Sample Head No. 6					ACCEPT
1	Ambient Air	68	69	1	
2	Cold Bath	37	37	0	
Sample Head No. 7					ACCEPT
1	Ambient Air	68	68	0	
2	Cold Bath	37	38	1	
Sample Head No. 8					ACCEPT
1	Ambient Air	68	68	0	
2	Cold Bath	37	37	0	

[a]Type of calibration used.

Calibrated By: AH

[b]Allowable tolerance ±2°F

DIGITAL INDICATORS FOR THERMOCOUPLE READOUT

A digital indicator is calibrated by feeding a series of millivolt signals to the input and comparing the indicator reading with the reading the signal should have generated. Errors did not exceed 0.5 percent when the temperatures were expressed in degrees Rankine. Calibration data are included in the following Thermocouple Digital Indicator Calibration Data Sheet(s).

ENVIRONMENTAL QUALITY MANAGEMENT

THERMOCOUPLE DIGITAL INDICATOR
CALIBRATION DATA SHEET

DATE: 13-Mar-02 INDICATOR NO.: MB-7

OPERATOR: JK SERIAL NO.: 10285505

CALIBRATION DEVI(Thermocouple Simulator MANUFACTURER: Omega

TEST POINT NO.	MILLIVOLT SIGNAL	EQUIVALEN T TEMP, °F	DIGITAL INDICATOR TEMP READING, °F	DIFFERENCE, %
1	-0.692	0	0	0.0
2	1.520	200	200	0.0
3	3.819	400	396	0.5
4	6.092	600	600	0.0
5	8.314	800	801	0.1
6	10.560	1000	1000	0.0
7	22.251	1200	1199	0.1
8	29.315	1400	1397	0.2
9	36.166	1600	1601	0.0
10	42.732	1800	1800	0.0

Percent difference must be less than or equal to 0.5 %

Percent difference: $\dfrac{\text{(Equivalent Temp., °R - Digital Indicator Temp., °R) * (1}}{\text{(Equivalent Temp., °R)}}$

Where °R = °F + 460

ACCEPT

ENVIRONMENTAL QUALITY MANAGEMENT

THERMOCOUPLE DIGITAL INDICATOR
CALIBRATION DATA SHEET

DATE: 28-Dec-01 INDICATOR NO.: MB-4

OPERATOR: AH SERIAL NO.:

CALIBRATION DEVI(Thermocouple Simulator MANUFACTURER: Omega

TEST POINT NO.	MILLIVOLT SIGINAL	EQUIVALEN T TEMP, °F	DIGITAL INDICATOR TEMP READING, °F	DIFFERENCE, %
1	-0.692	0	-2	0.4
2	1.520	100	98	0.4
3	3.819	200	199	0.2
4	6.092	300	298	0.3
5	8.314	400	396	0.5
6	10.560	500	497	0.3
7	22.251	1000	998	0.1
8	29.315	1300	1296	0.2
9	36.166	1600	1596	0.2
10	42.732	1900	1895	0.2

Percent difference must be less than or equal to 0.5 %

Percent difference: $\dfrac{\text{(Equivalent Temp,.}^{\circ}\text{R - Digital Indicator Temp., }^{\circ}\text{R) * (1(}}{\text{(Equivalent Temp., }^{\circ}\text{R)}}$

Where $^{\circ}R = {^{\circ}F} + 460$

ACCEPT

ENVIRONMENTAL QUALITY MANAGEMENT

THERMOCOUPLE DIGITAL INDICATOR
CALIBRATION DATA SHEET

DATE: 2-Jan-02 INDICATOR NO.: VB-1

OPERATOR: AH SERIAL NO :

CALIBRATION DEVICE: Thermocouple Simulator MANUFACTURER: Omega

TEST POINT NO.	MILLIVOLT SIGNAL	EQUIVALENT TEMP, °F	DIGITAL INDICATOR TEMP READING, °F	DIFFERENCE, %
1	-0.692	0	0	0.0
2	1.520	100	100	0.0
3	3.819	200	202	0.3
4	6.092	300	301	0.1
5	8.314	400	400	0.0
6	10.560	500	501	0.1
7	22.251	1000	1002	0.1
8	29.315	1300	1302	0.1
9	36.166	1600	1603	0.1
10	42.732	1900	1903	0.1

Percent difference must be less than or equal to 0 5 %

Percent difference: $\frac{(\text{Equivalent Temp., °R} - \text{Digital Indicator Temp., °R}) * (100\%)}{(\text{Equivalent Temp., °R})}$

Where °R = °F + 460

ACCEPT

ENVIRONMENTAL QUALITY MANAGEMENT

THERMOCOUPLE DIGITAL INDICATOR
CALIBRATION DATA SHEET

DATE: 2-Jan-02 INDICATOR NO.: VB-2

OPERATOR: AH SERIAL NO.:

CALIBRATION DEVICE Thermocouple Simulator MANUFACTURER: Omega

TEST POINT NO.	MILLIVOLT SIGNAL	EQUIVALENT TEMP, °F	DIGITAL INDICATOR TEMP READING, °F	DIFFERENCE, %
1	-0.692	0	0	0.0
2	1.520	100	100	0.0
3	3.819	200	202	0.3
4	6.092	300	300	0.0
5	8.314	400	399	0.1
6	10.560	500	500	0.0
7	22.251	1000	1001	0.1
8	29.315	1300	1301	0.1
9	36.166	1600	1602	0.1
10	42.732	1900	1901	0.0

Percent difference must be less than or equal to 0.5 %

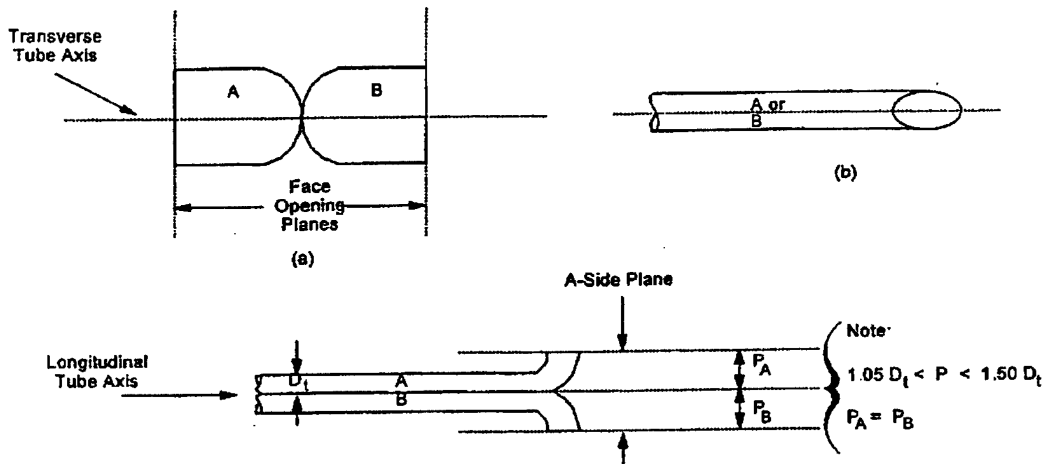
Percent difference: $\dfrac{(\text{Equivalent Temp., }^\circ R - \text{Digital Indicator Temp., }^\circ R) * (100\%)}{(\text{Equivalent Temp., }^\circ R)}$

Where $^\circ R = {}^\circ F + 460$

ACCEPT

Pitot Tube Calibration

Each pitot tube used in sampling meets all requirements of EPA Method 2, Section 4.1. Therefore, a baseline coefficient of 0.84 is assigned to each pitot tube. The following pages show the alignment requirements of Method 2 and the Pitot Tube Inspection Data Sheet(s) for each pitot tube used during the test program.**



(a) end view; face opening planes perpendicular to transverse axis;

(b) top view; face opening planes parallel to longitudinal axis;

(c) side view; both legs of equal length and centerlines coincident, when viewed from both sides. Baseline coefficient values of 0.84 may be assigned to pitot tubes constructed this way

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**40 CFR 60, Appendix A, July 1995

ENVIRONMENTAL QUALITY MANAGEMENT

PITOT TUBE CALIBRATIONS

Pitot ID	Date Calibrated	α_1	B_1	α_2	B_2	Y	θ	A	z	w	P_α	P_β	D_t	$A/2/D_t$	Accept/Reject
P2-1P	12/18/01	1.8	1.6	3.7	2.8	2	0.3	0.951	0.033	0.005	0.476	0.478	0.375	1.268	ACCEPT
P2-2P	12/18/01	1.3	0.4	3.0	0	0.4	0.2	0.945	0.007	0.003	0.473	0.473	0.375	1.260	ACCEPT
P2-3	12/21/01	3.1	1.2	3.9	0.9	2.1	1.8	0.947	0.035	0.030	0.474	0.477	0.375	1.263	ACCEPT
P3-1	12/21/01	1.3	2.6	1.8	2.8	1.6	1.3	0.941	0.026	0.021	0.475	0.475	0.375	1.255	ACCEPT
P3-2	12/21/01	3.7	1.8	2.8	2.6	3.4	1.9	0.940	0.056	0.031	0.477	0.478	0.375	1.253	ACCEPT
P3-3P	12/18/01	1.7	1.2	0.2	1.7	0.8	1.2	0.941	0.013	0.020	0.538	0.539	0.375	1.255	ACCEPT
P3-4P	12/18/01	1.7	0.3	4.5	0.4	1.3	0.4	0.943	0.021	0.007	0.474	0.474	0.375	1.257	ACCEPT
P4-1	12/21/01	0.6	1.4	1.6	1.5	2.3	1.3	0.955	0.038	0.022	0.477	0.477	0.375	1.273	ACCEPT
P4-2	12/18/01	0.2	1.8	1.5	1.4	0.3	1.2	0.943	0.005	0.020	0.473	0.472	0.375	1.257	ACCEPT
P4-3P	12/21/01	1.1	1.2	0.8	0.4	1.8	0.5	0.895	0.028	0.008	0.472	0.473	0.375	1.193	ACCEPT
P4-4P	12/21/01	0.7	2.2	1.2	1.3	1.6	0.7	0.940	0.026	0.011	0.472	0.472	0.375	1.253	ACCEPT
P4-5P	12/21/01	3.6	2.1	3.6	1.2	0.8	0.5	0.930	0.013	0.008	0.472	0.472	0.375	1.240	ACCEPT
T5-1	12/21/01	0.4	0.3	1.5	1.2	0.6	1.2	0.930	0.010	0.019	0.465	0.472	0.375	1.240	ACCEPT
T5-2P	12/21/01	0.3	2.0	0.4	1.0	0.8	1.2	0.975	0.014	0.020	0.488	0.472	0.375	1.300	ACCEPT
T5-3	12/21/01	5.5	1.6	6.4	1.5	1.5	1.5	0.935	0.024	0.024	0.468	0.472	0.375	1.247	ACCEPT
P6-1P	12/21/01	4.2	0.8	3.2	0.5	0.2	0.9	0.955	0.003	0.015	0.478	0.472	0.375	1.273	ACCEPT
P6-2	12/26/01	0.3	0.9	0.7	1.4	1.1	1.4	0.941	0.018	0.023	0.475	0.475	0.375	1.255	ACCEPT
P6-3P	12/26/01	3.0	1.2	2.9	0.7	1.1	0.4	0.910	0.017	0.006	0.461	0.461	0.375	1.213	ACCEPT
P6-4P	12/26/01	0.9	1.9	1.6	1.6	1.2	0.3	0.943	0.020	0.005	0.474	0.475	0.375	1.257	ACCEPT
T7-1P	12/26/01	0.1	0.5	2.3	0.8	0.4	0.2	0.928	0.006	0.003	0.474	0.475	0.375	1.237	ACCEPT
P8-1	12/26/01	2.7	0.6	1.4	0.1	0.6	0.4	0.945	0.010	0.007	0.465	0.466	0.375	1.260	ACCEPT
P8-2	12/26/01	0.8	1.5	2.6	0.8	0.9	0.3	0.939	0.015	0.005	0.486	0.486	0.375	1.252	ACCEPT
P8-3P	12/27/01	0.8	0.9	0.6	1.2	1.1	0.8	0.941	0.018	0.013	0.477	0.478	0.375	1.255	ACCEPT
P8-4P	12/27/01	0.3	0.6	0.7	0.1	0.7	0.5	0.941	0.011	0.008	0.473	0.473	0.375	1.255	ACCEPT
P8-5	12/26/01	0.7	0.7	0.4	0.3	1.0	1.0	0.950	0.017	0.017	0.472	0.472	0.375	1.267	ACCEPT
P9-1	12/26/01	1.2	0.5	1.2	0.3	0.4	0.6	0.939	0.007	0.010	0.472	0.472	0.375	1.252	ACCEPT
P10-1P	12/26/01	2.7	0.3	3.0	0.6	1.4	1.2	0.929	0.023	0.019	0.472	0.472	0.375	1.239	ACCEPT
T11-1P	12/26/01	1.0	0.3	0.1	0.3	1.1	0.5	0.965	0.019	0.008	0.472	0.472	0.375	1.287	ACCEPT

- 1 = Pitot Alone

- 1P = Full Probe Assembly

STACK THERMOCOUPLES

Each thermocouple is calibrated by comparing it with an ASTM-3F thermometer at approximately 32°F, ambient temperature, 212°F, and 500°F. The thermocouple reads within 1.5 percent of the reference thermometer throughout the entire range when expressed in degrees Rankine. The thermocouples may be checked at ambient temperature at the test site to verify the calibration. Calibration data are included in the following Thermocouple Calibration Data Sheet(s).

ENVIRONMENTAL QUALITY MANAGEMENT
STACK THERMOCOUPLES

Thermo. ID	Therm.	Date Calibrated	Ambient Air	Diff., %	Cold Bath	Diff., %	Hot Bath	Diff., %	Hot Oil	Diff., %	Accept/Reject
T2-1	Reference	12/27/01	67	0.19	38	0.40	162	0.48	442	0.22	ACCEPT
	Pitot		68		40		159		440		
T2-2	Reference	12/27/01	67	0.00	38	0.20	172	0.95	460	0.22	ACCEPT
	Pitot		67		39		166		458		
T2-3	Reference	12/27/01	67	0.19	38	0.20	180	0.78	460	0.65	ACCEPT
	Pitot		68		39		175		454		
T2-4	Reference	1/4/01	72	0.19	33	0.00	200	0.00	437	0.45	ACCEPT
	Pitot		71		33		200		433		
T2-5	Reference			0.00		0.00		0.00		0.00	ACCEPT
	Pitot										
T2-6	Reference	12/26/01	68	0.00	36	0.20	184	0.31	458	0.98	ACCEPT
	Pitot		68		37		182		449		
T2-7	Reference	3/27/02	73	0.19	38	0.40	165	0.16	368	0.36	ACCEPT
	Pitot		72		36		164		365		
T3-1	Reference	12/27/01	67	0.19	39	0.00	156	0.49	460	0.76	ACCEPT
	Pitot		68		39		153		453		
T3-2	Reference	12/27/01	67	0.19	38	0.40	168	0.16	442	0.44	ACCEPT
	Pitot		68		40		167		438		
T3-3P	Reference	12/28/01	68	0.19	40	0.40	172	0.63	460	0.43	ACCEPT
	Pitot		67		42		168		456		
T3-4P	Reference	12/28/01	68	0.19	36	0.20	162	0.16	460	0.65	ACCEPT
	Pitot		67		37		161		454		
T3-5	Reference	12/26/01	68	0.19	38	0.20	188	0.62	456	0.11	ACCEPT
	Pitot		67		37		184		455		
T3-6	Reference	12/26/01	68	0.00	38	0.20	187	0.46	456	0.11	ACCEPT
	Pitot		68		39		184		455		
T4-1	Reference	12/28/01	68	0.19	39	0.20	177	0.16	460	0.22	ACCEPT
	Pitot		67		40		176		458		
T4-2	Reference	12/28/01	68	0.00	39	0.20	178	0.31	460	0.54	ACCEPT
	Pitot		68		40		176		455		
T4-3P	Reference	12/28/01	68	0.00	36	0.00	184	0.31	436	0.00	ACCEPT
	Pitot		68		36		186		436		
T4-4P	Reference	12/28/01	68	0.00	36	0.20	180	0.16	440	0.67	ACCEPT
	Pitot		68		37		179		434		
T4-5	Reference	12/28/01	68	0.00	35	0.61	152	0.16	460	0.65	ACCEPT
	Pitot		68		38		151		454		
T4-6	Reference	12/26/01	68	0.00	35	0.00	179	0.63	458	0.00	ACCEPT
	Pitot		68		35		175		458		
T4-7	Reference	12/28/01	68	0.00	36	0.40	178	0.47	458	0.11	ACCEPT
	Pitot		68		38		175		457		
T4-8	Reference	3/27/02	73	0.19	37	0.20	165	0.16	400	0.35	ACCEPT
	Pitot		72		36		164		397		
T5-1	Reference	12/28/01	68	0.00	36	0.20	181	0.00	450	0.11	ACCEPT
	Pitot		68		37		181		449		
T5-2P	Reference	12/28/02	68	0.00	37	0.00	186	0.31	458	0.22	ACCEPT
	Pitot		68		37		184		456		
T5-3	Reference	12/28/01	68	0.00	36	0.20	178	0.16	450	0.22	ACCEPT
	Pitot		68		37		177		448		
T5-4	Reference	3/27/02	73	0.19	36	0.20	170	0.32	390	0.24	ACCEPT
	Pitot		72		35		168		388		
T5-5	Reference	3/27/02	73	0.19	36	0.20	170	0.32	402	0.35	ACCEPT
	Pitot		72		35		168		399		
T6-1	Reference	12/28/01	68	0.00	38	0.20	198	0.30	451	0.33	ACCEPT
	Pitot		68		39		196		448		
T6-2	Reference	12/28/01	68	0.00	38	0.20	198	0.15	451	0.11	ACCEPT
	Pitot		68		39		199		450		
T6-3P	Reference	12/28/01	68	0.00	38	0.00	198	0.15	453	0.22	ACCEPT
	Pitot		68		38		197		451		
T6-4P	Reference	12/28/01	68	0.00	37	0.00	200	0.15	454	0.11	ACCEPT
	Pitot		68		37		199		453		
T6-5	Reference	12/28/01	68	0.19	38	0.00	198	0.30	451	0.11	ACCEPT
	Pitot		67		38		196		450		
T7-1	Reference	12/28/01	68	0.19	37	0.40	180	0.31	450	0.55	ACCEPT
	Pitot		69		39		178		445		
T8-1	Reference	12/28/01	68	0.00	37	0.40	190	0.62	456	0.44	ACCEPT
	Pitot		68		39		186		452		
T8-2	Reference	12/28/01	68	0.19	37	0.20	200	0.30	440	0.11	ACCEPT
	Pitot		69		38		198		439		
T8-3P	Reference	12/28/01	68	0.19	37	0.20	181	0.16	440	0.33	ACCEPT
	Pitot		69		38		180		437		
T8-4P	Reference	12/28/01	68	0.00	37	0.00	181	0.16	440	0.44	ACCEPT
	Pitot		68		37		180		436		
T8-5	Reference	12/28/01	68	0.00	37	0.40	202	0.45	460	0.65	ACCEPT
	Pitot		68		39		199		454		
T9-1	Reference	12/28/01	68	0.00	38	0.20	183	0.16	440	0.00	ACCEPT
	Pitot		68		39		182		440		
10-1	Reference	12/28/01	68	0.00	38	0.20	181	0.16	448	0.22	ACCEPT
	Pitot		68		39		182		446		
T11-1	Reference	12/28/01	68	0.00	39	0.00	180	0.31	448	0.55	ACCEPT
	Pitot		68		39		178		443		

RATA CLASS

Dual-Analyzed Calibration Standard

Scott Specialty Gases
1290 COMBERMERE STREET,TROY,MI 48083

Phone· 248-589-2950 Fax· 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P O No.: 1336 PN NO 3001
Project No.: 05-71938-021

Customer

ENVIRONMENTAL QUALITY MGT
TOM GERSTLE
1310 KEMPER MEADOW DRIVE
SUITE 100
CINCINNATI OH 45240

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997

Cylinder Number: ALM060361 **Certification Date:** 1/06/01 **Exp. Date:** 1/08/2004
Cylinder Pressure*:** 1900 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ANALYTICAL ACCURACY**	TRACEABILITY
METHANE	49.28 PPM	+/- 1%	Direct NIST and NMi
AIR	BALANCE		

*** Do not use when cylinder pressure is below 150 psig
** Analytical accuracy is based on the requirements of EPA Protocal procedure G1, September 1997
Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMI standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2751	2/01/03	AAL18705	100.2 PPM	METHANE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
VARIAN/1400/08982426	01/06/01	FLAME IONIZATION

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis **Second Triad Analysis** **Calibration Curve**

METHANE

Date:01/06/01	Response Unit:AREA	
Z1=0.00000	R1=91571.00	T1=44865.00
R2=91289.00	Z2=0.00000	T2=44986.00
Z3=0.00000	T3=44938.00	R3=91338.00
Avg Concentration·	49.28	PPM

Concentration=A+Bx+Cx2+Dx3+Ex4

r=0.99999936	2751
Constants:	A=0.039401
B=0.001075	C=0.00
D=0.00	E=0.00

APPROVED BY·

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET,TROY,MI 48083

Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P.O. No.: 1336
Project No.: 05-86005-007

Customer

ENVIRONMENTAL QUALTIY MANAGEMENT
DOUG ALLEN
1800 CARILLON BLVD
CINCINNATI OH 45240

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM005469 **Certification Date:** 12/17/01 **Exp. Date:** 12/16/2004

Cylinder Pressure*:** 1900 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ANALYTICAL ACCURACY**	TRACEABILITY
CARBON DIOXIDE	9.94 %	+/- 1%	Direct NIST and NMi
OXYGEN	19.99 %	+/- 1%	Direct NIST and NMi
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig

** Analytical accuracy is based on the requirements of EPA Protocal procedure G1, September 1997
Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMi standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2300	1/01/04	ALM047453	23.34 %	CARBON DIOXIDE
NTRM 2350	2/01/04	A1377	23.51 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
PIR/2000/609015	12/14/01	NDIR
ROSEMOUNT/755R/1000430	12/17/01	PARAMAGNETIC

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis **Second Triad Analysis** **Calibration Curve**

CARBON DIOXIDE

First Triad Analysis		
Date:12/14/01	Response Unit:%	
Z1=0.00000	R1=130.0000	T1=78.00000
R2=130.0000	Z2=0.00000	T2=78.00000
Z3=0.00000	T3=78.00000	R3=130.0000
Avg. Concentration:	9.940	%

Calibration Curve	
Concentration=A+Bx+Cx2+Dx3+Ex4	
r=.999996084	2300
Constants:	A=-0.0019163
B=1.02E-1	C=-7.77E-5
D=5.19E-6	E=0

OXYGEN

First Triad Analysis		
Date:12/17/01	Response Unit:%	
Z1=0.00000	R1=23.51000	T1=20.00000
R2=23.51000	Z2=0.00000	T2=20.00000
Z3=0.00000	T3=20.00000	R3=23.51000
Avg. Concentration:	19.99	%

Calibration Curve	
Concentration=A+Bx+Cx2+Dx3+Ex4	
r=.9999986310	2350
Constants:	A=-0.0145321
B=1.00	C=0
D=0	E=0

APPROVED BY:

RATA CLASS

Dual-Analyzed Calibration Standard

Scott Specialty Gases
1290 COMBERMERE STREET,TROY,MI 48083
Phone: 248-589-2950 · Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P.O. No.: 3220
Project No.: 05-90064-002

Customer
ENVIRONMENTAL QUALTIY MANAGEMENT
PO#7428
1800 CARILLON BLVD
CINCINNATI OH 45240

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM035348 **Certification Date:** 3/26/02 **Exp. Date:** 3/25/2005
Cylinder Pressure*:** 1900 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ANALYTICAL ACCURACY**	TRACEABILITY
CARBON DIOXIDE	20.53 %	+/- 1%	Direct NIST and NMi
OXYGEN	10.56 %	+/- 1%	Direct NIST and NMi
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig
** Analytical accuracy is based on the requirements of EPA Protocal procedure G1, September 1997
Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMI standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2300	1/01/04	ALM047730	23.34 %	CARBON DIOXIDE
NTRM 2350	2/01/04	A1377	23.51 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
PIR/2000/609015	03/25/02	NDIR
ROSEMOUNT/755R/1000430	03/25/02	PARAMAGNETIC

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis — **Second Triad Analysis** — **Calibration Curve**

CARBON DIOXIDE

Date:03/25/02	Response Unit:%	
Z1=0.00000	R1=130.0000	T1=121.5000
R2=130.1000	Z2=0.00000	T2=121.6000
Z3=0.00000	T3=121.6000	R3=130.0000
Avg Concentration:	20.53	%

Concentration=A+Bx+Cx2+Dx3+Ex4
r=.999998 2300
Constants: A=-0.0053288
B=9.84E-2 C=-4.24E-5
D=5.13E-6 E=0

OXYGEN

Date:03/25/02	Response Unit:%	
Z1=0.00000	R1=23.51000	T1=10.56000
R2=23.51000	Z2=0.00000	T2=10.56000
Z3=0.00000	T3=10.57000	R3=23.52000
Avg. Concentration:	10.56	%

Concentration=A+Bx+Cx2+Dx3+Ex4
r=1.000 2350
Constants: A=0.0001380
B=1.0000 C=0
D=0 E=0

APPROVED BY:

COMPLIANCE CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET,TROY,MI 48083 Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P.O. No.: 1336 PN NO.3001
Project No.: 05-71938-029

Customer

ENVIRONMENTAL QUALITY MGT
TOM GERSTLE
1310 KEMPER MEADOW DRIVE
SUITE 100
CINCINNATI OH 45240

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; September, 1997

Cylinder Number: ALM016610 **Certification Date:** 1/08/01 **Exp. Date:** 1/08/2004
Cylinder Pressure*:** 2000 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ANALYTICAL ACCURACY**	TRACEABILITY
METHANE	298.6 PPM	+/- 2%	NIST and NMi
AIR	BALANCE		

*** Do not use when cylinder pressure is below 150 psig
** Analytical accuracy is based on the requirements of EPA Protocal procedures, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2751	2/01/03	AAL18705	100.2 PPM	METHANE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
BECKMAN/400 A/2000630	01/08/01	FLAME IONIZATION

APPROVED BY: [signature]

COMPLIANCE CLASS

Dual-Analyzed Calibration Standard

Scott Specialty Gases

1290 COMBERMERE STREET,TROY,MI 48083

Phone· 248-589-2950 Fax· 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P.O No.: 1336 PN NO.3001
Project No · 05-71938-027

Customer

ENVIRONMENTAL QUALITY MGT
TOM GERSTLE
1310 KEMPER MEADOW DRIVE
SUITE 100
CINCINNATI OH 45240

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; September, 1997

Cylinder Number: ALM059985 **Certification Date:** 1/08/01 **Exp. Date:** 1/08/2004

Cylinder Pressure*:** 2000 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
METHANE	124.6	PPM	+/- 2%	NIST and NMi
AIR		BALANCE		

*** Do not use when cylinder pressure is below 150 psig

** Analytical accuracy is based on the requirements of EPA Protocol procedures , September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2751	2/01/03	AAL18705	100 2 PPM	METHANE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
BECKMAN/400 A/2000630	01/08/01	FLAME IONIZATION

APPROVED BY· Scott [signature]

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET,TROY,MI 48083

Phone· 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: Interference Free™ EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P.O. No · 3220
Project No.: 05-90064-006

Customer

ENVIRONMENTAL QUALTIY MANAGEMENT
PO#7428
1800 CARILLON BLVD
CINCINNATI OH 45240

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM013077 **Certification Date:** 3/26/02 **Exp. Date:** 3/25/2004

Cylinder Pressure*:** 1880 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
NITRIC OXIDE	448.0	PPM	+/- 1%	Direct NIST and NMi
NITROGEN - OXYGEN FREE		BALANCE		
TOTAL OXIDES OF NITROGEN	452.0	PPM		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig

** Analytical accuracy is based on the requirements of EPA Protocal procedure G1, September 1997
Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMI standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1686	10/01/04	1L2047	500 7 PPM	NO/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9300205	03/08/02	Scott Enhanced FTIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis / **Second Triad Analysis** / **Calibration Curve**

NITRIC OXIDE

First Triad Analysis:

Date:03/19/02	Response Unit:PPM	
Z1=0 11360	R1=500.0881	T1=447.7814
R2=501.0287	Z2=0 12260	T2=447.4968
Z3=0 17630	T3=447 7115	R3=500.9831
Avg Concentration:	447 7	PPM

Second Triad Analysis:

Date: 03/26/02	Response Unit: PPM	
Z1=-0.24490	R1=500 1173	T1=448 1859
R2=501.3585	Z2=-0 11040	T2=448.2963
Z3=0.04130	T3=448.1703	R3=500.6241
Avg Concentration:	448.2	PPM

Calibration Curve:

Concentration=A+Bx+Cx2+Dx3+Ex4	
r=0.999990	
Constants:	A=0.000000
B=1.000000	C=0.000000
D=0.000000	E=0.000000

APPROVED BY: ____________________

Scott King

~~RATA CLASS~~

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET,TROY,MI 48083 Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: Interference Free™ EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P O No.: 1336
Project No.: 05-77299-008

Customer

ENVIRONMENTAL QUALITY MGT
DOUG ALLEN
1310 KEMPER MEADOW DRIVE
SUITE 100
CINCINNATI OH 45240

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997

Cylinder Number: ALM058944 **Certification Date:** 5/09/01 **Exp. Date:** 5/09/2003
Cylinder Pressure*:** 1904 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
NITRIC OXIDE	885.5	PPM	+/- 1%	Direct NIST and NMi
NITROGEN - OXYGEN FREE		BALANCE		
TOTAL OXIDES OF NITROGEN	885.5	PPM		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig
** Analytical accuracy is based on the requirements of EPA Protocal procedure G1, September 1997
Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMi standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1687	3/01/03	ALM024688	1000 PPM	NO/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9300205	04/16/01	Scott Enhanced FTIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

NITRIC OXIDE

First Triad Analysis

Date:05/02/01	Response Unit:PPM	
Z1=0.01980	R1=1001.274	T1=887.3146
R2=1000.612	Z2=0.13200	T2=886.7747
Z3=0.33380	T3=885.3155	R3=998 1135
Avg. Concentration:	886.5	PPM

Second Triad Analysis

Date: 05/09/01	Response Unit: PPM	
Z1=-0.09230	R1=1007 179	T1=887.6901
R2=1000.818	Z2=0.24120	T2=884.3168
Z3=0.44340	T3=881.5648	R3=992.0023
Avg Concentration:	884.5	PPM

Calibration Curve

Concentration=A+Bx+Cx2+Dx3+Ex4	
r=0.999990	
Constants:	A=0.000000
B=1.000000	C=0.000000
D=0.000000	E=0.000000

APPROVED BY: [signature]

Scott King

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET,TROY,MI 48083 Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P.O. No.: 1336 PN NO.3001
Project No : 05-71938-012

Customer

ENVIRONMENTAL QUALITY MGT
TOM GERSTLE
1310 KEMPER MEADOW DRIVE
SUITE 100
CINCINNATI OH 45240

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997

Cylinder Number: ALM001568 **Certification Date:** 1/09/01 **Exp. Date:** 1/09/2004

Cylinder Pressure*:** 1900 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
CARBON MONOXIDE	149 4	PPM	+/- 1%	Direct NIST and NMi
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig

** Analytical accuracy is based on the requirements of EPA Protocal procedure G1, September 1997
Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMi standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1681	3/01/03	ALM022971	977.1 PPM	CARBON MONOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
HORIBA/A1A-220/57297601	01/09/01	NDIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis | **Second Triad Analysis** | **Calibration Curve**

CARBON MONOXIDE

Date:01/02/01	Response Unit:MV	
Z1=0.00000	R1=100.0000	T1=19.50000
R2=100.0000	Z2=0.00000	T2=19.50000
Z3=0.00000	T3=19.50000	R3=100.0000
Avg Concentration:	148.8	PPM

Date: 01/09/01	Response Unit: MV	
Z1=0.00000	R1=100.0000	T1=19.60000
R2=100.0000	Z2=0.00000	T2=19.70000
Z3=0.00000	T3=19.70000	R3=100.0000
Avg Concentration:	150 1	PPM

Concentration=A+Bx+Cx2+Dx3+Ex4	
r=.999999857	1681
Constants:	A=-0 118597868
B=7.264635392	C=0.017490412
D=7.58397E-5	E=0

APPROVED BY:

RATA CLASS

Dual-Analyzed Calibration Standard

Scott Specialty Gases

1290 COMBERMERE STREET,TROY,MI 48083

Phone· 248-589-2950 Fax· 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P O No · 1336 PN NO.3001
Project No.: 05-71938-010

Customer

ENVIRONMENTAL QUALITY MGT
TOM GERSTLE
1310 KEMPER MEADOW DRIVE
SUITE 100
CINCINNATI OH 45240

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997

Cylinder Number: ALM046772 **Certification Date:** 1/09/01 **Exp. Date:** 1/09/2004

Cylinder Pressure*:** 1900 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ANALYTICAL ACCURACY**	TRACEABILITY
CARBON MONOXIDE	59.39 PPM	+/- 1%	Direct NIST and NMi
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig

** Analytical accuracy is based on the requirements of EPA Protocal procedure G1, September 1997

Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMI standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1679	1/01/03	ALM008021	101 7 PPM	CARBON MONOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
HORIBA/A1A-220/57297601	01/09/01	NDIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

CARBON MONOXIDE

First Triad Analysis

Date:01/02/01	Response Unit:MV	
Z1=0.00000	R1=100.0000	T1=59 10000
R2=100.0000	Z2=0.00000	T2=59.20000
Z3=0.00000	T3=59 10000	R3=100.0000
Avg Concentration:	59.36	PPM

Second Triad Analysis

Date: 01/09/01	Response Unit: MV	
Z1=0.00000	R1=100.0000	T1=59.20000
R2=100.0000	Z2=0.00000	T2=59.20000
Z3=0.00000	T3=59.20000	R3=100.0000
Avg Concentration:	59.42	PPM

Calibration Curve

Concentration=A+Bx+Cx2+Dx3+Ex4	
r=.999995366	1679
Constants:	A=-0.024349778
B=1.03693084	C=-0.001050125
D=8.39335E-6	E=0

APPROVED BY:

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET,TROY,MI 48083 Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P.O. No.: 1336 PN NO 3001
Project No : 05-71938-009

Customer

ENVIRONMENTAL QUALITY MGT
TOM GERSTLE
1310 KEMPER MEADOW DRIVE
SUITE 100
CINCINNATI OH 45240

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM049331 **Certification Date:** 1/09/01 **Exp. Date:** 1/09/2004
Cylinder Pressure*:** 1900 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ANALYTICAL ACCURACY**	TRACEABILITY
CARBON MONOXIDE	30.07 PPM	+/- 1%	Direct NIST and NMi
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig
** Analytical accuracy is based on the requirements of EPA Protocal procedure G1, September 1997
Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMI standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1679	1/01/03	ALM008071	101.7 PPM	CARBON MONOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
HORIBA/A1A-220/57297601	01/09/01	NDIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

CARBON MONOXIDE

First Triad Analysis

Date:01/02/01	Response Unit:MV	
Z1=0.00000	R1=100.0000	T1=29.70000
R2=100.0000	Z2=0.00000	T2=29.70000
Z3=0.00000	T3=29.70000	R3=100.0000
Avg Concentration:	30.07	PPM

Second Triad Analysis

Date: 01/09/01	Response Unit: MV	
Z1=0.00000	R1=100.0000	T1=29.70000
R2=100.0000	Z2=0.00000	T2=29.70000
Z3=0.00000	T3=29.70000	R3=100.0000
Avg Concentration:	30.07	PPM

Calibration Curve

Concentration=A+Bx+Cx2+Dx3+Ex4

r=.999995366	1679
Constants:	A=-0.0243498
B=1.04	C=-0.001050125
D=8.39E-6	E=0

APPROVED BY: ____________